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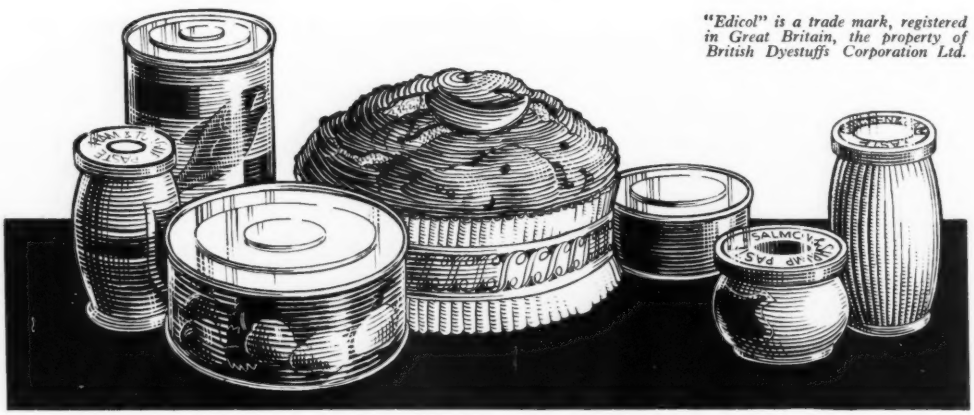

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Volume . . . X
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JANUARY . . 1935

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FOOD MANUFACTURE

Vol. X, No. 1 January, 1935

Rather Comic!

WE ARE living in a Gilbertian State! The scheme of the Milk Marketing Board for the supply of milk to school children is now in operation. It has been decided that all milk supplied to schools under the jurisdiction of the London County Council shall be pasteurised, and in accordance with the arrangements made between the medical officers of health of the Metropolitan Boroughs and the County Council, samples are being taken for chemical analysis and bacteriological examination.

So far so good, but now the fun begins! A Medical Officer of Health in a recent letter to the *Lancet* makes some amazing statements. *Inter alia:* "It is my considered opinion that most of the reports now received with regard to the bacteriological examination of milk are unreliable, and if the official procedure be carried out serious injustice may be done."

Recently, the correspondent stated, he became dissatisfied with the results of the examination of samples, which at that time were being submitted to one of the largest laboratories specialising in this work. Accordingly he sent duplicate samples of the same milk to two laboratories. Report No. 1 stated that the milk contained 39,850 bacteria per c.c. (well within the prescribed limit), whereas Report No. 2 found 144,000 per c.c. or nearly 50 per cent. above the legal maximum! In another series of reports on the same sample of pasteurised milk one laboratory reported only 9,270 bacteria per c.c., whereas another reported 3,400,000! He then went a step further and sent the same sample of milk in two different sterile bottles to the same laboratory and was informed that one sample contained 147,000 bacteria per c.c. and the other 3,400,000!

The Remedy

It is obvious that to withdraw a licence upon such unreliable data would be most unjust. The Ministry of Health has set out a suggested technique for the bacteriological examination of graded milks. If this is carried out faithfully there should be no such discrepancies, but the trouble is that individual bacteriologists vary their technique considerably, with disastrous results. Every stage from the composition of the media to uniform heating in the incubators must be standardised. Any bacteriologist who is testing milk should be compelled by law to employ standardised methods and standardised apparatus and carry out tests in duplicate or triplicate before issuing a report on which a milk supplier's reputation and livelihood may depend.

The present situation is nothing short of disgraceful and, in view of the facts disclosed to the *Lancet*, little or no value can be placed on the present reports, and until a more standard practice is adopted by bacteriologists both time and money are being wasted in submitting milk samples for examination. Bacteriologists who issue such unreliable reports on such a fundamentally important matter deserve a full measure of Oriental torture; something lingering with boiling oil in it? or would boiling milk suffice?

Sugar Beet

A report entitled "British Sugar Beet — Ten Years' Progress under the Subsidy" has just been issued by the Agricultural Economics Research Institute, Oxford. In it the effect of sugar beet on farming and the costs incurred and returns obtained by growers are fully discussed. It is suggested that the beet industry failed to achieve success in a great many arable districts, partly because the soil was unsuited to beet and partly because there were no factories in the areas concerned. It is shown that sugar beet is not the ideal crop for an agricultural relief policy, since considerations other than agricultural dictate the placing of factories and in the absence of an exorbitant subsidy it must be grown near them.

While the report suggests that by a combination of improved sugar prices, lower factory costs and a reduced price to farmers of beet, the Exchequer may be relieved of some of its present burden, it is pointed out that the industry cannot possibly be self-supporting. So far as the agricultural aspect is concerned the evidence of this report shows that the maintenance of the industry undoubtedly involves assistance to the growers. The report goes on to make certain suggestions in the interests of public economy, but, as we have repeatedly pointed out, the cultivation of sugar beet has proved to be an uneconomic proposition and we would have none of it.

A Successful Symposium

The most successful, and also the most enjoyable, symposium we have attended for many years was one organised by the International Society of Leather Trades' Chemists on December 7 at the University College, Gower Street. The subject was the Technical Aspects of Emulsions, and although it covered a wide range of industries the matter was of great interest to food technologists, for is not colloid chemistry one of the foundation stones of food technology? Dr. Clayton would say that it *is* the whole foundation, but we would not go as far as that, for the biological sciences must find a place among the basic subjects.

Dr. Clayton, by the way, opened the symposium with a paper on the study of emulsions in the patent literature. He remarked that in the domain of food technology numerous patents have been granted for emulsions, many referring to artificial milks. Of controversial interest is the question of incorporating oil and fat emulsions in bread in order to effect modification of the gluten (Brit. 289,060; 1927). In bakery goods, emulsions of shortening agents are frequent, the patent claims referring to the nature of the emulsifying agent.

Lecithin

Dr. Clayton discussed the uses of lecithin as an emulsifying agent. Its emulsifying power is claimed to be improved by treating the emulsion with hydrogen peroxide (Brit. 356,384; 1929). The wide utilisation of lecithin in chocolate (Brit. 330,450; 1929) in order to reduce the tendency to bloom, to enhance fluidity in the conche and to save cocoa butter depends on wetting phenomena fundamental in the study of emulsions. That this is due to molecular groupings of polar character is emphasised by the recent patent claiming increased fluidity of chocolate by the use of a compound prepared by causing a polyhydric alcohol, a compound introducing an acid radical containing P and O, and fatty acids or oils to interact (Brit. 407,248; 1934). Incidentally, blooming is claimed to be avoided by the proper incorporation of gelatin (U.S. 1,800,985-6-7; 1931).

Mayonnaise

Dr. Jordan would have us believe that mayonnaise can be made in a bucket if we are to take as literal his remark that "if a man can't make an emulsion with a bucket and a stick, he's not much good anyway." Dr. Corran, on the other hand, has carried out an extensive range of experiments (not in a bucket, of course), which indicate that mustard flour has a definite stabilising effect on mayonnaise, especially when the mustard is incorporated with the egg during the first stage of the mixing process. Mustard is thus an excellent emulsifying agent, in addition to being a flavouring agent, in mayonnaise.

Dr. Corran's paper contained much information of practical value. He dealt with factors which are important in determining the stability of mayonnaise, such as the order of adding the ingredients and the time and degree of agitation. The general process adopted in mixing mayonnaise is to take the dry ingredients, salt, mustard, etc., and mix them thoroughly with the egg yolk in the presence of a small amount of the aqueous ingredients. The oil is then run in slowly with rapid mixing, to form a nucleus of a very thick consistency.

The Mayonnaise Nucleus

During this process, the nucleus, which is a concentrated emulsion of oil dispersed in water, becomes thicker and thicker, and the remaining oil is beaten into it. The efficient formation of this nucleus is a most important operation in making mayonnaise. This is followed by dilution with the rest of the aqueous ingredients.

Dr. Corran gives as a typical formula for a mayonnaise, omitting those flavouring ingredients which do not exert an effect on the persistence of the emulsion:

Oil	75·0 per cent.
Salt	1·5 ,, ,,
Egg yolk	8·0 ,, ,,
Mustard	1·0 ,, ,,
Water	3·5 ,, ,,
Vinegar (6 per cent. acetic acid)	11·0 ,, ,,

The oil is dispersed in the aqueous phase (water and vinegar) with the aid of the emulsifying agents (egg yolk and mustard) and a high-speed beater of the wire whisk type. By way of an example, for a gallon batch the egg yolk—solid mixture was beaten for 5 minutes; addition of the oil took a further 10 minutes, and the addition of the acid took 1 minute. Finally, the mayonnaise was stirred for 1 minute at a slow speed.

Emulsifying Machines

Another symposium paper analysed in considerable detail the design of emulsifying machines. This paper was presented by Robert Johnson, B.Sc., and was followed by an interesting discussion in the course of which reference was made to the use of the homogeniser type of machine in the preparation of mayonnaise. Nobody appeared to be able to quote definite data which would enable one to decide whether it is advisable to use such a machine in mayonnaise manufacture, but the general impression gained was that its use is superfluous, and that for a satisfactory product all that is required is a beater. It would be interesting to have more information on this point.

This brings us to the dinner, and here again mayonnaise repeated itself and formed the butt of an after-dinner wit, who gave the following (so far as we can recollect) impromptu rendering:

> Mayonnaise is very good to eat,
> With a little bit of salmon it's a veritable treat,
> But then I'm told it's apt to repeat.

And—would you believe it—Doctors Clayton and Corran laughed more than anybody else over this sly sally!

The Dinner

Scientific dinners are usually rather dull affairs. Everyone seems to be stricken with a coagulated thyroid, but the colloid chemists evidently know how to get over this, for the evening's dinner and entertainment were bright and gay. Dr. A. Turnbull was in the chair, and the guests were Prof. F. G. Donnan, Prof. H. Freundlich, and Mr. E. Hatschek—all stars in the colloid firmament, or as Dr. Dorothy Jordan Lloyd, Director of the British Leather Manufacturers Research Association, put it in the course of a very witty speech, they were the three colloid—or was it colloidal?—musketeers. An amusing incident was the presentation to Prof. Donnan by Dr. C. H. Spiers of a Donnan pipette of one litre capacity, which we rather suspect was filled with beer or some other consumable liquor, because it was full one moment and empty the next—so to speak.

We thought the French stood alone in this sort of thing, but we have revised our opinion. If colloid chemists, who reside well up in the clouds for most of the year, can come down to earth and make a really good job of a social gathering, surely food and other brands of chemists can do likewise. It is a pity that Prof. Waldschmidt-Leitz was unable, owing to illness, to give his lecture on December 12 to the Food Group on recent developments in enzyme chemistry, especially as there was to have been a lunch given in his honour, and Dr. Lampitt *does* know how to arrange a lunch!

Jelly Making

Mr. George Baker, chemist in the University of Delaware Agricultural Experiment Station, who gave an account in last month's issue of his new method of jelly manufacture, informs us that he has just received a letter from the first man to adopt his method on a small commercial scale in Florida. This man prefers to determine the end-point of the cook by temperature, but reports that he has not had a single jelly failure where formerly such failures were numerous. He also says that the last glass of jelly in a batch of over a thousand was found to be the same as the first.

We hope that manufacturers in this country will try out Mr. Baker's method, and we should like to hear that they have met with equal success.

Chemically Bleached Flour

The food cranks are at it again. Every so often one of them manages to get a letter into a reputable medical paper and then someone else follows it up. The latest of these tirades has recently appeared in the *Lancet* and some rather amusing misstatements occurred. One statement is that "in my opinion the principal objection to the bleaching of flour is that it necessitates the removal of the germ". From our own knowledge of the processes of milling we should say that the germ is removed from the flour to enhance the keeping qualities of the latter. The bulk of the fat of wheat is located in the germ and, if left in the flour, rancidity soon sets in and the development of mites is accelerated.

Another statement is: "It is very desirable that a campaign should be started in this country to

disabuse the public mind as to the imaginary superiority of very white bread and to impress upon the public the greater advantages, both from the dietetic and health points of view, of bread prepared from unbleached and untreated flour." In spite of this the fact remains that the demand for white bread is greatest among the heavy manual workers, who certainly are not lacking in health and strength, and during the war the doctors recommended white bread for the troops on account of the physical strains to which they were subjected. White bread contains more digestible matter than wholemeal because the human stomach cannot assimilate cellulose, hence it is true that, weight for weight, white flour contains more available nutriment than wholemeal.

Foods and Fertilisers

The manuring of potatoes has recently assumed more importance since the marketing scheme restricts the acreage planted and places a premium on heavy yields and large tubers. Some very important work has been carried out at Rothamsted on this subject, details of which are given in the recently published annual report of the work of the station. Trials carried out at Rothamsted and other places show that the responses to nitrogen were, as a rule, much the same whether normal yields were high or low. Two cwt. of sulphate of ammonia an acre added 1 to 2 tons of potatoes to the yield in one-half of the experiments, and it can be said that generally an additional 15 cwt. of potatoes an acre resulted from the application of 1 cwt. of sulphate of ammonia.

Responses to superphosphate were very variable. In some trials the superphosphate plots yielded less than those without it. There is a lot to be learned about the factors determining the response to phosphates. The experiments seem to show that sulphate of ammonia and superphosphate reinforce each other's effect.

Cooking Quality

In conjunction with Messrs. Lyons' laboratories further work has been carried out at Rothamsted on the influence of fertilisers on cooking quality. This appears to be very slight. Sulphate of ammonia slightly decreased and potassium fertilisers slightly increased the quality for steaming, but neither affected the quality for frying. Soils seem to have a greater influence than added fertilisers. By no fertiliser treatment has it been possible to raise the quality of the Rothamsted potatoes to the level of those grown at Woburn. The practical conclusion is that quality is determined by soil and season, and yield by fertiliser dressing. Quality will not be affected one way or another by complete manuring, so the grower can aim at heavy crops without fear of impaired quality.

Products from Fungi

A few days ago we saw an extremely interesting exhibit at the London School of Hygiene and Tropical Medicine on the occasion of the 32nd Conference of the Society for Experimental Biology. This was a demonstration by Professor Raistrick and his colleagues of some of the products which they have obtained in the course of their work on the metabolism of lower fungi. By growing various species and strains of fungi on a glucose medium, Professor Raistrick has succeeded in obtaining about 60 compounds which have never before been prepared, even in the organic chemist's laboratory. Mostly they are compounds of complicated structure. In addition he has isolated about 20 known compounds, such as acetaldehyde, glycerol, ethyl acetate, calcium gluconate, mannose, galactose, idose, and fumaric, succinic, malic, and citric acids. When one considers the enormous number of fungi and the almost endless variations which are possible in composition of media, concentration, temperature, and so on, one's imagination is stirred at the thought of the industrial possibilities which lie in this field of bio-chemical work.

This work has been going on patiently for a number of years in accordance with a special technique which has been developed by Professor Raistrick. Carefully controlled conditions have, of course, to be observed, and a staff of highly skilled biochemists is constantly engaged in unravelling the structures of the products obtained.

Ergosterol Manufacture

As an example of an industrial application of this work we may take the case of the manufacture of ergosterol, which is now being carried out in America by the cultivation of a certain strain of mould on a medium of such a composition as to give the maximum yield of ergosterol. The advantage of this process over the usual one, in which ergosterol is extracted from yeast, is that it yields a bye-product in the form of takadiastase, which is readily marketable.

METALS in the FOOD INDUSTRY

By J. M. Bryan, Ph.D.

(Low Temperature Research Station, Cambridge)

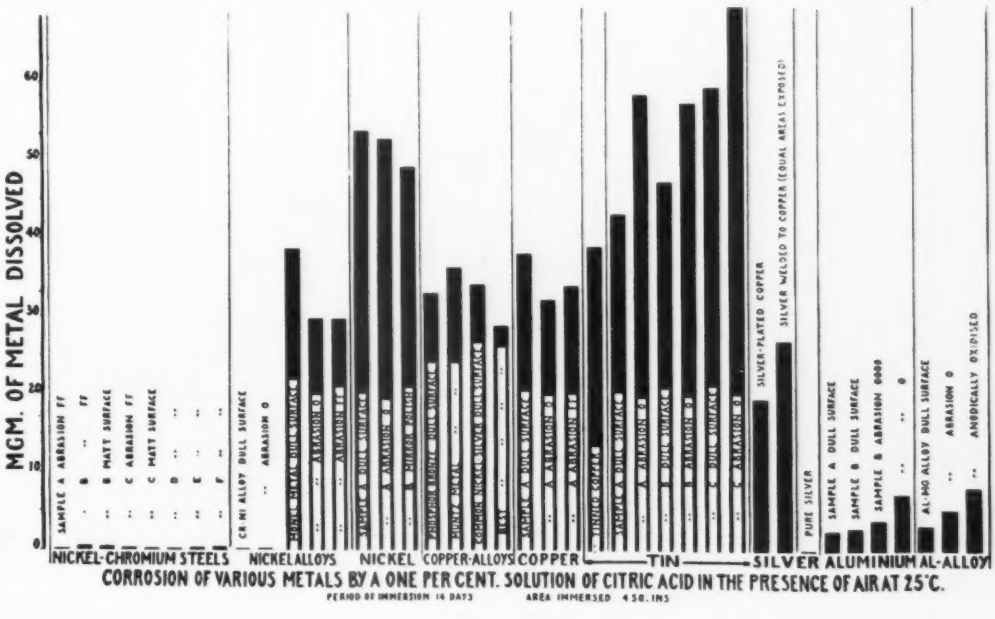
IN A previous paper[1] it was pointed out that the metals in use in the food industry could be classified broadly into two groups according to their behaviour towards acid products. The metals of the first group included copper, tin, nickel and their alloys, which, owing either to their position in the electrochemical series or to their high overvoltage, did not readily suffer corrosion of the hydrogen-evolution type but were attacked in the presence of oxygen. The second group included metals like aluminium and its alloys, the stainless steels, the nickel-chromium alloys, and chromium itself, which are below hydrogen in the electrochemical series and would readily suffer corrosion of the hydrogen-evolution type but for the protection afforded by a film of oxide on their surface. In this second group oxygen tended to inhibit corrosion by keeping the film in repair. The present paper gives an account of a number of tests carried out at the Low Temperature Research Station on the relative corrodibility of various metals used in the food industry by a solution of citric acid at 25° C.

Test Conditions Employed

The experiments were carried out with the type of apparatus and the technique described by Morris and Bryan in Reports of the Food Investigation Board from 1928 to 1932. The metal specimens used in these tests measured 3 in. by 1 in. and were partially immersed in a 1 per cent. solution of citric acid to a depth of 2 in. In most cases the effect of surface abrasion on corrosion was studied, and in some cases the studies were supplemented by working with samples of a metal obtained from different sources. The results for tests conducted in the presence and absence of air over periods of 14 and 28 days, respectively, are shown by Diagrams I and II. It must be noted that these diagrams represent only the results of one temperature, viz., 25° C., and it will subsequently be necessary to carry out supplementary studies at a higher temperature and to ascertain also the effect on corrosion of fruit juices and other media such as acid brines and acid sugar syrups.

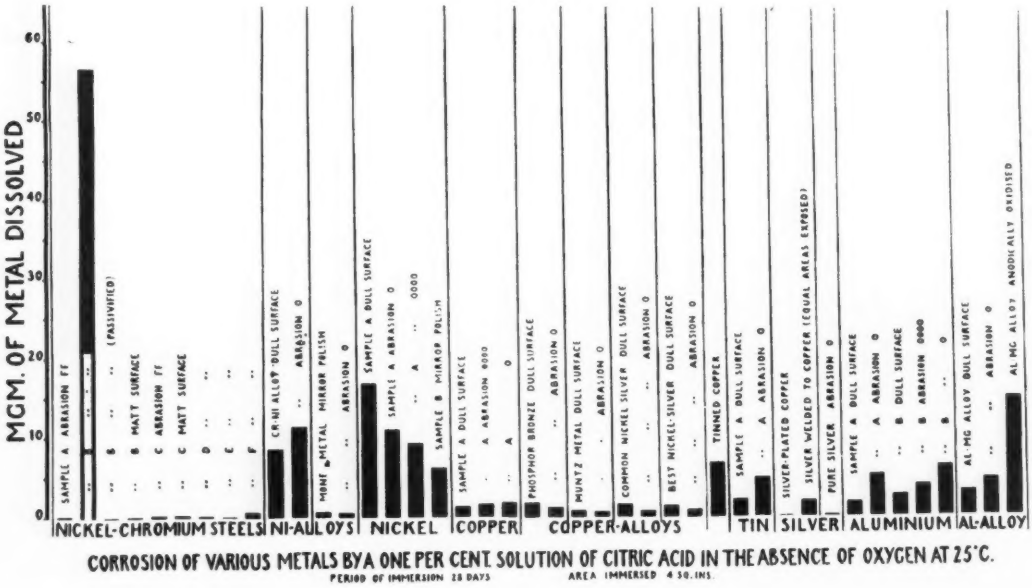
Results

An inspection of the diagrams shows that *the stainless steels* were all very resistant to corrosion in the presence of air, whether the surface had been freshly abraded or not. In the complete absence of oxygen, however, some of the samples were observed to corrode badly in the citric acid solutions if the surface had been freshly abraded. They could, however, be rendered passive by merely removing them from the solution, washing, drying and exposing to air for a time before re-immersing them in the oxygen-free solutions. They could also be rendered passive in the oxygen-free solutions if they were pre-immersed in the solution *in the presence of air*, but corrosion by citric acid could not be prevented by allowing the freshly abraded specimens to stand either in



a loosely covered vessel containing moisture or in a desiccator for long periods.

A *chromium-nickel alloy* containing about 6 per cent. of iron showed more corrosion by citric acid in the absence of air than in its presence, but the figures were low and it seems that this is a promising material. If it stands up to other conditions it should be of value for industrial purposes. *Nickel,* like the chromium-nickel alloy, corroded in the absence of air; unlike the alloy, it showed a considerable corrosion in the presence of air. Fine abrasion of the surface reduced the corrosion of nickel but increased the corrosion of the nickel-chromium alloy. *Monel metal* was very resistant in the absence of air. In the presence of air it corroded about as fast as copper but not as quickly as nickel. *Copper* has given good results in the absence of air but some corrosion occurred in its presence.



CORROSION OF VARIOUS METALS BY A ONE PER CENT. SOLUTION OF CITRIC ACID IN THE ABSENCE OF OXYGEN AT 25°C.

PERIOD OF IMMERSION 28 DAYS AREA IMMERSED 4 SQ. INS.

The Effect of Abrasion

It is of interest to note with copper, monel metal and nickel that there was actually less corrosion with the finely abraded than with the clean but unabraded samples of the rolled metal. From the practical point of view this result is interesting because it indicates that it is beneficial, when using vessels of copper, monel metal or nickel in the preparation of acid food products, that they should be freshly cleaned, and that the use of a fine abrasive for this purpose is not harmful.

The *copper alloys, e.g.,* phosphor bronze, Muntz metal and the nickel silvers, behaved in a similar way to copper; Muntz metal showed the least corrosion in the absence of air and the greatest corrosion in the presence of air, but, on the whole, there was not much difference between them. With all these alloys fine abrasion had the effect of slightly reducing the corrosion. *Tin* showed little corrosion in the absence of air, but very considerable attack in its presence. Abrasion of tin appeared to stimulate corrosion in the presence of air, especially with the purest sample A. Sample B, which was the least pure of the three, corroded less in the abraded condition than the other two samples. It was suggested[2] that either antimony or copper, which were the main impurities in the sample, might be responsible for this inhibition of corrosion, and Hoar[3] has since shown that small amounts of antimony reduce the corrosion of tin by dilute citric acid.

Tinned copper corroded faster in the absence of air than either of the component metals singly, and consequently does not appear to be a suitable material to use with acid products. In the presence of air the rate of corrosion corresponded to that of copper rather than to that of tin.

Silver

Pure silver was quite immune from corrosion whether oxygen was present or absent, but the diagram shows that silver plating does not necessarily afford protection for copper when air is present. In the experiment in which silver and copper are exposed in equal areas, it is seen that the corrosion of the copper is accelerated by contact with silver, since it was considerably more than half as great as in the three tests with copper alone, where twice the area of copper was exposed. This result is of importance from a practical point of view, for it suggests that when silver-plated vessels are used for acid products, it is necessary to see to the efficiency of the silver plating and to re-plate as soon as any imperfections in the coating are apparent.

With *aluminium* the difference between air-free and air-present conditions is less than with most of the other metals, and in both cases fresh abrasion tended to increase the corrosion. Aluminium and the Al-Mg alloy both show excellent resistance to a typical fruit acid at 25° C., but the former is known to dissolve fairly readily in organic acids at high temperatures with evolution of hydrogen. It is noteworthy that the so-called anodically oxidised aluminium, which undoubtedly has better resistance to atmospheric and some other conditions, shows a greater loss in weight in acid solutions than either the untreated alloy or the pure metal.

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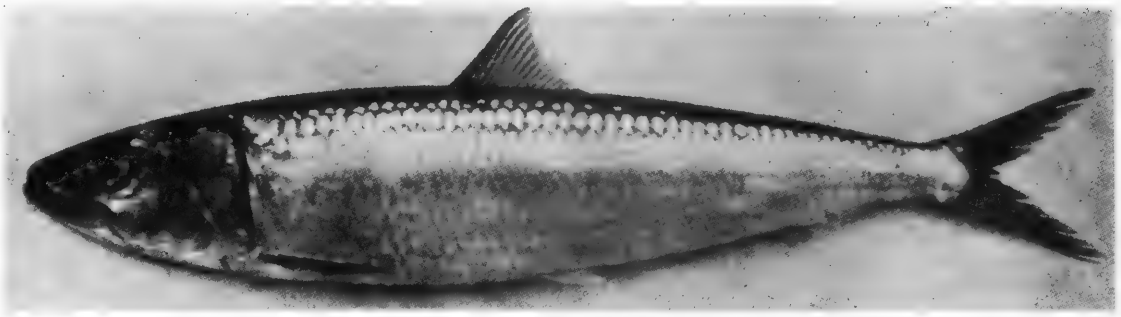
[1] J. M. Bryan, FOOD MANUFACTURE, 1933, **8**, p. 399.
[2] J. M. Bryan, Annual Report of the Food Investigation Board for the year 1933, p. 154.
[3] T. P. Hoar, *J. Inst. of Metals*, 1934, **55**, p. 207.



SARDINE CANNING IN CALIFORNIA

By R. S. Croker*
(California State Fisheries Laboratory).

Retorting

AFTER THE rinse the cans drop into large iron baskets with wheels, which when full are pushed into the retorts for the final cook. In the retort (see Fig. 7) the cans are cooked for 75 to 90 minutes at a heat of 240° F. under 11 lb. pressure, the time varying from one cannery to another. The aim is to give the fish a thorough, sterilising cook.[1] After the cans have been in the retort the desired length of time, a stream of cold water is turned on them. At the same time the pressure gauge is slowly turned to 15 lb. to overcome the drop in pressure that the cold water would otherwise occasion. A sudden decline of pressure would cause the retort to collapse. The oval can presents a large flat surface, and if it were cooled at ordinary atmospheric pressure it would burst, hence the stream of cold water in the retort. As the air pressure is increased the steam is turned off. After the water has stood in the retort for a few minutes the door is opened and the baskets are pulled out and wheeled to a storeroom for further cooling.

Labelling and Casing

All that remain to be done now are labelling and casing. Sometimes the cans are dipped in a tank of lacquer before labelling. The lacquer not only retards rusting which otherwise would occur in damp tropical countries, but gives the cans a golden hue, desirable in certain markets. The labelling machine is an ingenious device. The cans are fed by hand on to a conveyor that leads to the labeller. Each can drops in an upright position on to an individual carrier that brushes part of the can against some glue and then spins it past a sheaf of labels. The glue picks up the outermost label, which is affixed as the can goes by. In order to be on the safe side, the label states the can's contents as 15 oz. As a matter of fact the ovals average a full pound, net weight, including sardines and sauce. The cans are carried on a short conveyor from the labelling machine to the case packers. These men place the cans in fibreboard or wooden boxes, four dozen to the case. The lids of the fibreboard boxes are glued shut, and the wooden cases are nailed and wired. The cases are either placed in the adjoining warehouse until needed or loaded directly into freight cars or trucks. The labelling and casing crew consists of 6 to 12 men.

Variations of Procedure

As a variation from the above method of packing oval cans, some canneries subject the sardines to a brine bath after they have been cleaned. The pieces of fish are left for 1½ to 2 hours in the brine tanks, which contain a saturated salt solution. The salt removes the slime from the surface of the fish and draws out some of the blood and moisture. It is also claimed that the flavour is improved by soaking the sardines in brine.

At some canneries the cutters do not sever the tails of the sardines, as was mentioned previously. It is said that tails help to hold the fish in place in the can during the first cooking, which often causes the fish to hump or bend.

The tomato or mustard sauce is added in a variety

[1] The California Department of Public Health, through its Bureau of Cannery Inspection, has formulated certain regulations regarding minimum retort temperatures and length of cook. These regulations are based on the research work of Dr. Karl F. Meyer, of the Hooper Foundation for Medical Research, University of California. All the canneries abide by the regulations, although some prefer to cook their fish longer than the law specifies. All retorting times given in this article are the minimum legal times, except that in the cases where some canners retort their fish longer than required the maximum times are also given.

* Concluded from December, 1934, issue.

of ways. In some plants all the conveyors from the one large exhaust box pass under one sauce machine, such as the one shown in Fig. 5, after which the cans are diverted on to a larger number of conveyors, each going to one closing machine. At other plants the conveyor from each table goes to a separate exhaust box and closing machine, with one small sauce dispenser on each machine. At other canneries the sauce is added either before the precook or after the cans have been but part of the way through the exhaust box. The sauce is usually, but not always, hot when placed in the cans. Some oval cans are put up without either tomato or mustard sauce. These cans are filled with hot brine after the precook.

Some exhaust boxes are heated to about 230° F. by gas flame. It is claimed that the additional heat results in a better cooked, firmer product.

Several canneries precook their sardines in a somewhat different manner from any listed above. At these plants the packers place the filled cans in shallow wire baskets, two or three layers deep. The baskets are placed in wheeled racks which are pushed into the steam cookers, wherein tuna are processed at other times. In these cookers the cans are subjected to live steam under 2 lb. pressure for about 25 minutes. The racks are then removed, and the baskets are inverted over a wire screen for a few minutes. This allows the cans to drain without losing the fish. Tomato or mustard sauce is now added, and the cans are given a brief cooking in an ordinary exhaust box in order to maintain the vacuum. They are then capped, washed, and retorted in the same manner as described above.

The Broiling Method

One of the Northern California canneries precooks its fish with radiant heat instead of steam. In this process the fish are cleaned, brined, and placed in the cans raw, as described above. The filled cans enter a series of ovens where the sardines are broiled for about 45 minutes at a temperature of approximately 450° F. After the precook the cans are drained and hot tomato sauce is added. Sealing, washing, and retorting follow. The cannery that developed this process claims that broiling results in firmer fish with less "after-taste" than steam-cooked fish. The equipment is patented.

Vacuum Pack

In order to prepare sardines for the "vacuum pack", they are soaked in saturated brine for 1½ to 2 hours immediately after being cleaned. They go from the brine tank to the dryer. This device consists of a large enclosed box through which a strong current of air is circulated by rotary blowers or fans. The dryer is kept at room temperature or higher. The fish enter one end at the top, from which point a belt conveyor carries them to the other end, where they drop on to another belt that carries them back, and then on to a lower belt, back and forth for an hour. They then emerge and go to the packing tables on a conveyor. In the vacuum pack there is no precook, hence the brining and drying to shrink the fish and make them firm.

The packing method is the same as for the precook pack. The filled cans pass under the sauce machines where the tomato or mustard is added. From here they go direct to the closing machines without passing through an exhaust box.

The first operation of the vacuum closing machine is to affix the lid, which, however, is not sealed tight but merely crimped. The can now goes into the vacuum chamber, where it remains for 5 seconds. In this part of the machine a vacuum is maintained by suction pumps. The air is sucked out of the can, leaving the fish and sauce in a vacuum. The lid is sealed tight while the can is still in the vacuum chamber. The can

FIG. 6.—Scene in a California sardine cannery. The row of closing machines is at the right. The retorts are at the left. There are 12 "oval" closing machines, 3 "tall round" machines, and a dozen retorts in this cannery, one of the largest in the State.

then emerges and drops on to the conveyor leading to the washer and retorts. Fig. 8 illustrates a vacuum closing machine. The cans are retorted 75 to 90 minutes at 240° F., as described above.

Opinion is divided as to the success of the vacuum pack for sardines. Proponents claim a superior, tastier product without the bother and expense of an exhaust box. Other canners claim that vacuum packed cans are loosely filled and that the fish is undercooked. They point out the number of swelled cans resulting from the vacuum method. However, the vacuum pack, as far as sardines are concerned, is a recent development, and each season sees an improvement in the pack resulting in less rejected cans. The packers have no difficulty in disposing of their output, and after all that is the final test of quality.

Some canners have thought that perhaps the finest sardine pack of all would result from a combination of the precook and vacuum methods. Hence all eyes are turned on one of the northern canneries that put such a method into production in the fall of 1934. At this plant the unsealed cans are given a brief precook at a fairly high temperature, after which they are drained and allowed to cool. Then sauce is added and the cans go to the vacuum sealer and then to the retorts. The product is said to be of excellent quality.

Sardines are packed in ½-lb. oval cans in the same ways as described above for 1-lb ovals. The smaller cans are retorted 55 to 60 minutes at 240° F.

Packing Sardines in Round Cans

The output of sardines in tall, round cans represents several different styles of pack—*i.e.*, sardines in brine, in tomato sauce, mustard, spices, cotton seed oil, and olive oil; and smoked sardines in the same variety of sauces. All these styles are packed in three sizes of cans; principally in 5-oz. and 16-oz. and to a lesser extent in 12-oz. containers.

Of the various styles, brine-packed sardines, both smoked and plain, are the most important. Nearly all the canneries pack sardines in brine on a quantity basis, whereas a few plants put up the other products more or less as specialities.

The following description applies to brine-packed sardines in their simplest form. The fish are cleaned and cut, as described above. They are cut to about the same length as the height of the can. The packers fill the cans by hand with raw, unbrined fish, placing the fish on end. Three pieces of fish fill a 5-oz. can, four or more longer pieces fill the larger tins. The full cans go on a belt to the exhaust box for the precook. Five-ounce cans are exhausted for 5 or 6 minutes; 12-oz. and 16-oz. tins for 15 to 35 minutes, depending upon the cannery. The cans then pass under a series of jets that fill them with hot brine. Inspectors remove loose pieces of fish and fins, and reject underfilled cans. At the closing machine a topper compresses the sardines which sometimes project a little from the can after cooking. Sealing and washing follow, after which the cans drop into iron retort boxes. In the retorts 5-oz. cans are cooked 55 to 60 minutes at 240° F. The 12-oz. and 1-lb cans are cooked 90 to 95 minutes at the same temperature. Cooling, labelling, and casing complete the process.

Some canners soak the cut sardines in brine before packing. This process removes the slime and makes the fish firmer.

At a few plants the packers place the full cans upside down in wire baskets. The baskets are run through the exhaust box and the cans drain as they cook. The cans are righted after the precook and are then filled with brine. The flavour and firmness of the sardines are said to be improved by this process, which, however, removes much of the oil from the fish.

At one point the exhaust box is in two sections. In the first part the 1-lb. cans are given a 15-minute steam cook. The second part is maintained at a temperature of 220° to 240° F., dry heat. The cans spend another 15 minutes in this section, where some of the excess moisture is cooked out. Fish processed in this cooker are claimed to be firmer and tastier than those cooked in the ordinary steam box.

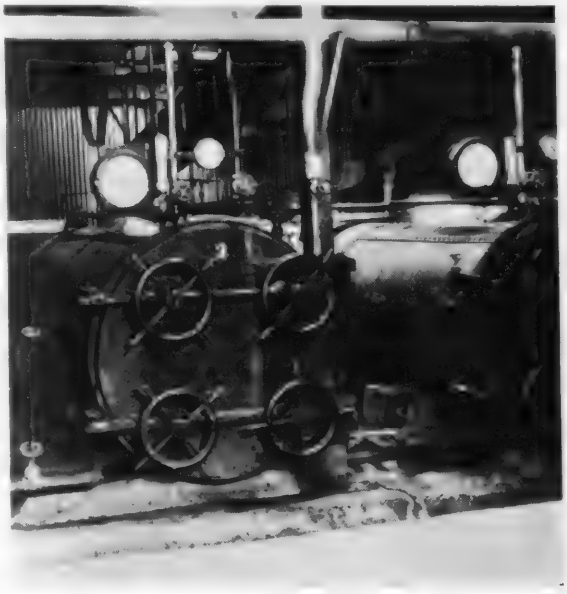


FIG. 7.—The retorts where the sealed cans are cooked at a high temperature to sterilise the contents.

One cannery produces a "smoked" pack by adding a small amount of "liquid smoke" to the fish just before the can is sealed. The liquid smoke is a concentrated wood derivative. Retorting diffuses the smoked flavour throughout the can.

For the true smoked pack, the fish are actually processed in a smokehouse after soaking in brine for 1½ to 2 hours. The smokehouse is similar to the dryer used for vacuum-packed ovals. Smoke is produced by burning hardwood sawdust on an iron plate over a gas flame. The smoke is drawn into the smokebox by the blowers, as is sufficient hot air to heat the box to about 90° F. The fish require 1 to 1½ hours to pass through the smokehouse. After smoking, the packing methods are the same as described above.

The only difference in process between the brine-pack

FIG. 8.—A vacuum closing machine for oval sardine cans. A sealed can is emerging at the head of the runway in the left foreground.

and other styles is that the brine is added to the cans after the precook, whereas the heated tomato sauce, mustard, or oil is put into the cans before they enter the exhaust box.

Many canners prefer to pack sardines in round cans rather than in ovals, because of the lower cost of the former type of can, its greater ease of handling, and the less complicated closing and labelling machines necessary. It is possible to use one line for packing either "tall" sardines or mackerel, thus minimising capital investment.

Packing Sardines in Quarter-Pound Square Cans

The bulk of the California output of 4-oz. flat, square cans containing small sardines in oil is produced at San Diego. Young sardines, 5 to 7 inches long, are used for this style pack. These fish are known locally as "quarter-oils" or "quarters", because of the can used in packing them. The quarter-oils are usually caught within 10 miles of the canneries. As the small fish bruise and spoil readily, small loads only are accepted, and the canners process the fish immediately upon arrival at the plant.

As soon as the fish are unloaded from the boat they go to the cutting tables, where they are beheaded and cleaned by hand. Care is taken to remove all the viscera. The fish are too delicate to permit any scaling operations, but most of the scales fall off during handling.

The cleaned fish are soaked in 65 per cent. brine for approximately 30 minutes. From the brine tanks the sardines go to the dryer, which is similar to the one described previously. The air in the dryer is warmed somewhat above room temperature. About 45 minutes are required for the transit of the dryer.

The fish are next fried in a tank of cotton seed oil. The bottom of the tank contains water heated by steam pipes. A thick layer of oil floats on the water, which is hot enough to hold the oil at a temperature of approximately 180° F. The sardines are placed in wire baskets, which in turn are placed in the hot oil. A conveyor moving at a regulated speed carries the baskets from one end of the tank to the other. Upon arrival at the far end, the baskets are removed from the oil. The duration of the cook varies from 3 to 10 minutes, depending on the size and condition of the fish and on the state of the weather. In general, large fish require more cooking than small ones. Frying is intended to result in a pack of firm fish; consequently the softer sardines must be fried a little longer than those arriving at the cannery in the best of condition. When the air is damp the fish must be cooked more thoroughly than during dry weather or they will become soggy while cooling. After the oil-fry the fish are allowed to cool and drain in the baskets for 3 hours or more before being packed.

The packers place the fish lengthwise in the cans by hand. Six to 12 fish, and rarely as many as 20, are used to fill each can, according to the size of the sardines. The usual number is 8 to 12. The packers reject all broken or torn fish, using perfect ones only. The filled cans pass through a steam cooker, where they are exhausted for 2 to 7 minutes, depending again on the size of the fish. After the steam cook the cans are drained and then filled with heated olive oil or, more rarely, with cotton seed oil. After sealing and washing, the cans are retorted for 75 minutes at 230° F.

Instead of, or in addition to, carrying the type of label used on round or oval cans, the square cans are wrapped in wax paper with the lithographed labels pasted on the outside. Most of the cans are intended to be opened with keys, in which case the keys are wrapped with the can.

Quarter-oil sardines are kept in storage 3 to 6 months before being sold. The flavour continues to improve during the first six months the fish are aged.

The author wishes to express his appreciation for the assistance rendered in the preparation of this report by the members of the fishing industry, especially Mr. Alfred Luthi of the American Can Company; also, his thanks are due to Mr. D. H. Fry, Jr., who assisted in taking the photographs (*San Pedro, February*, 1934).

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ALTHOUGH at present there is no commercial production of salmon liver oil, a fair prospect of its becoming commercially important was recently indicated by findings of the U.S. Bureau of Fisheries which have shown that this oil contains a high vitamin A and D content.

Samples of salmon liver oil prepared from fish of the Columbia River and the Fraser River in British Columbia showed a vitamin A potency up to 20 times greater than cod liver oil. Columbia River salmon liver oil was fully three times as potent in vitamin D as the cod liver oil used as a control.

The Sterilisation of Dairy Farm Utensils using Dry Heat

By J. C. Marquardt
(New York Agricultural Experimental Station, Geneva, N.Y.)

Introduction

THE TREATMENT of dairy utensils with heat on the farm to produce a condition approaching sterility has been practised for many years. The desired result of this "sterilisation"* is to eliminate utensils as a significant factor in affecting the bacterial content of milk. "Sterilisation" is accomplished by destruction of most of the bacteria in the utensils by heat and the prevention of subsequent growth by lack of moisture in which the bacteria can live.

Boiling water, although a very effective "sterilising" agent, is not often recommended on account of the difficulty of maintaining a scalding temperature as all the utensils are brought in contact with the water. Steam is generally considered very satisfactory, for it can be generated in a container in which all the utensils can be placed at one time, and even at 212° F. it is very effective when the time of exposure is sufficient to heat the metal thoroughly. Attention should also be called to the general use of chemical disinfectants, such as chlorine compounds, but the present work was concerned only with dry-heat "sterilisation".

For twenty years the cans, pails, strainers, etc., used at this station have been "sterilised" by steaming for thirty minutes in a galvanised iron box large enough to hold them all at one time. This has always been regarded as the orthodox manner of treatment on farms producing grade A milk.

Even though the utensils were removed while hot and were inverted on a drain rack, they often remained wet. In the summer the bacteria grew in the wet cans during the twenty-four or forty-eight hours' storage before use, and sometimes materially increased the bacterial count of the milk placed in them. As a consequence an endeavour was made to devise some procedure for drying the "sterilised" utensils.

The well-known slow sterilising action of absolute dry heat, as shown by Koch and Wolffhugel† as early as 1881, would necessitate heating to such high temperatures that the solder in the cans, pails, etc., might be softened. Ayers and Mudge,‡ in 1921, considered blowing dry hot air into daily equipment for "sterilisation". They recommended 230° F. for thirty minutes. However, the equipment is always wet from the wash sink when placed in the "steriliser", so that if heat is applied from outside the container holding the equipment, with little escape of air, the increased temperature will evaporate the water and produce water vapour for "sterilising" at lower temperatures than by blasts of hot dry air. Actual tests showed this hot water vapour generated from the utensils themselves to be practically as effective in destroying bacteria as live steam. Obviously, a temperature will be reached which will be 212° F. or slightly less, at which water cannot exist as a liquid, with the result that the equipment will be absolutely dry. Since the dryness of the equipment is a very important factor in preventing bacterial growth in "sterilised" utensils, the contemplated procedure would give two desired results—namely, "sterilisation" and drying.

Method

In the summer of 1929 a specially constructed "steriliser" for dairy utensils was installed in the station dairy laboratory and has been in constant use for routine work since that time. The "steriliser" was built of galvanised iron, insulated with celotex, with a piece of ¼-in. boiler plate underneath so as to prevent the heat being so intense at the bottom over the flame that the utensils would be injured. The heat from gas burners struck the boiler plate, was diffused, and passed through the false sides, over the top, and out through a short chimney. The heat was distributed fairly evenly over the bottom, sides, and top of the container, thus giving a reasonably uniform temperature in the box. At first the "steriliser" was operated by hand, and finally by an automatic oven control. This "steriliser" was designed to hold all utensils from one washing. Later it became necessary to refill the "steriliser". This presented a problem which will be adequately considered in this article.

* The word "sterile" as used by bacteriologists means complete absence of life, but "sterilisation" as used in the dairy industry will be enclosed in quotation marks in this article and refers to the killing of the majority of the micro-organisms.

† Koch, R., and Wolffhugel, G.—Untersuchungen über die Desinfektion mit heiser Luft, *Mitth. aus dem Gesundheitsamte*, **1**, 1881.

‡ Ayers, S. H., and Mudge, C. S.—Hot Air Sterilisation of Dairy Utensils, *Jour. Dairy Sci.*, **4**, 79-90, 1921.

Cans were placed in the unit to determine "sterilisation" efficiency at temperatures ranging from 160° to 220° F. for various periods of holding. In all cases the moisture on the cans was noted.

In this work the cans were washed, then rinsed with 500 c.c. of a contaminating water containing a miscellaneous milk-grown infection and a high contamination of colon-ærogenes bacteria, as indicated by gaseous fermentation. One contaminated can after draining was rinsed with 500 c.c. of sterile water. Of this sterile water rinse 0·1 c.c., 1 c.c., and 2 c.c. were plated in duplicate to obtain a knowledge of the bacterial condition of the cans. In later work 1 to 100 and 1 to 1,000 dilutions were also made. The results are all given as the bacterial contamination per can, this figure having been calculated from the count on 1 c.c. from the 500 c.c. (about 1 pint) of sterile rinse water used in each can.

After the heat treatment the other can was rinsed with 500 c.c. of sterile water and 0·1 and 2 c.c. portions plated. A plate count of the contaminating material was made in duplicate in a dilution of 1 to 100,000.

The bacteriological technique given in Standard Methods of Milk Analysis was followed throughout this investigation in estimating bacterial numbers and presence of colon-ærogenes bacteria by lactose broth fermentation, except that slightly more severe sterilisation temperatures were employed. All glassware and media were checked for sterility.

The procedure for preparing the contaminating material was as follows: Into a solution containing 1 per cent. of raw milk and 2 per cent. of dehydrated broth 1 gm. of dried pulverised cow manure was added per 1,000 c.c. of solution. This solution was incubated for twenty-four hours at 98° F. This contaminating material was a mixed flora representing many types of organisms encountered in the dairy industry. The miscellaneous contamination was chosen in preference to pure cultures to make certain that the results would apply to practical dairy conditions. Bacteria of the colon-ærogenes group were purposely introduced for two reasons: first, because they are often associated with fæcal and disease contaminations; and, second, because they are more difficult to kill by heat than most of the common disease organisms that may infect milk. Also, their presence is so readily determined by gaseous fermentation. The complete destruction of the colon-ærogenes group would indicate the absence of disease-producing bacteria, which would occur before the proper degree of "sterility" is secured.

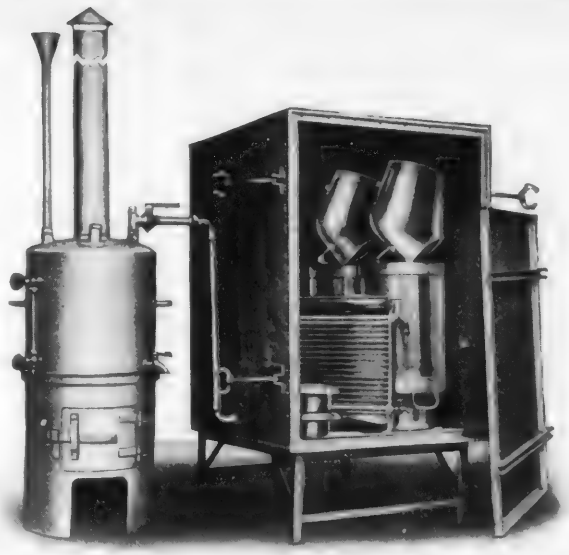
Finally, a study was made to determine the limitations in using the equipment from the standpoint of refilling for several batches of utensils during one washing operation. The temperature changes were noted when the "steriliser" was opened to remove cans and to refill the outfit. The effect on the heating rate of placing hot and cold cans in the "steriliser" was determined. For the major portion of the work utensils were washed and placed in the "steriliser" under conditions comparable to those used on the farm. For all the later work the consumption of electricity was recorded in kilowatt hours.

Interior of a Modern Italian Dairy.

Results

In considering the results attention should be given to several factors which affect the rate of heating, the absorption of heat, and the success of heat treatment. The temperature of the air, the number, location, and temperature of the utensils, the moisture on the utensils, uneven heat distribution, and the sensitiveness of the heating unit are factors which decidedly affect the operation of the unit.

Preliminary results, in which the temperatures were secured by dry heat and by steam in the "steriliser" heated by gas, show that either steam or moist air can be successfully used to "sterilise" utensils on the farm. Exposure to a temperature of 212° F. for fifteen minutes was comparable for either steam or moist air. The results show further that a temperature of 230° F. for twenty-five minutes gave only slightly better results than 212° F. for fifteen minutes. It was observed that temperatures of 200° F. or above were desirable to ensure dry cans when dry heat was used as the heating medium.



(*Courtesy, Unitea Dairies Ltd.*)

Equipment used for "Sterilisation" by the method most commonly employed in this country.

Discussion

These studies have revealed that dry heat "sterilisers" can be constructed and installed so that 35° F. represents the greatest variation in different sections of the "steriliser". The studies have revealed further that each "steriliser" should be provided with a thermometer and automatic temperature control. Also, a vent should be provided for allowing moisture to escape. The thermometer should be located in the top of the "steriliser" as far away from the heating element as practical. The thermometer, by actual trials, should record minimum temperatures within the "steriliser".

The "steriliser" should be built without shelves or with wire grid shelves, as solid shelves check the free circulation of heat. Each installation should have a wire grid to support the cans. This allows a free circulation of heat, and also prevents melting the solder in the utensils at times when the temperatures are excessively high due to mechanical irregularities.

Temperatures below 200° F. for prolonged holding periods are not recommended. The bacterial destruction was unsatisfactory because temperatures below 200° F. did not always completely dry the utensils. It is essential that utensils be inverted in the unit so that they can drain.

The temperature of the utensils when placed in the "steriliser" or their number are minor factors in the efficient operation of a dry-heat "steriliser", except for rapidity of heating and consumption of electricity or gas.

The bacteriological studies have revealed the desirability of filling the "steriliser" only once following each cleaning of the utensils. It has been demonstrated that two "sterilisations" can be made in succession, for the first batch receives the benefit of the time required to heat to the given temperature, together with a ten-minute holding period, while the second batch receives the benefit of remaining in the "steriliser" for several hours after the desired temperature has been reached.

The question of what constitutes a sufficient degree of "sterilisation" in a can is important, and there is no acknowledged standard. Obviously, all can counts are too low, for all bacteria cannot be rinsed off the walls of the can into the 500 c.c. of rinse water. According to the Laboratory Methods Committee of the International Association of Milk Dealers, a can with a total count of 100,000 is considered sufficiently "sterile". In the present study four factors have been employed to determine a minimum heat standard for "sterilising" cans, as follows: (1) The heat treatment must destroy all bacteria of the colon-ærogenes group, thus indicating the absence of disease-producing bacteria; (2) the bacterial count per can should be so low that the count of milk placed in it would not be affected; (3) the can should be dry to prevent bacterial growth and to avoid the development of objectionable odours on standing; and (4) there should be a factor of safety for variations in the operation of the "steriliser".

Conclusions

1. Results in "sterilising" dairy utensils comparable to those obtained with live steam were secured in a dry-heat "steriliser", generating water vapour from the wet utensils.

2. A temperature of 212° F. maintained for fifteen minutes produced either with steam or dry heat rendered wet utensils equally free from bacterial contamination.

3. A temperature of 200° F. maintained for at least ten minutes was required in moist air "sterilization" by dry heat to render utensils sufficiently free from organisms for practical use. This temperature and time were sufficient to kill all bacteria of the colon-ærogenes group, to dry the utensils, and to reduce the bacterial contamination to insignificant numbers.

4. Temperatures of 200° F. or above for ten minutes should include either the time required to heat or the time required to cool the container.

5. "Sterilisation" by the application of dry heat to wet utensils appears to be a practical method of "sterilising" dairy farm equipment on farms producing high-grade milk. It eliminates the need for steam and dries the utensils.

6. Gas and electricity are equally efficient in the application of dry-heat "sterilisation" to wet dairy utensils.

APPLE PREPARATIONS

By S. V. Poultney

NATURE DURING 1934 was unusually prolific in the provision of fruits, especially of raspberries, plums, and apples, and the result has been seen not only on the fruit stalls and in the markets—where fruit has been virtually given away—but in the price of preserved fruit, especially jam.

There is, however, a limit to the consumption of jam, and though we may be able to purchase a 2-lb. pot of plum jam—or the ubiquitous plum and apple—for sixpence, it is obvious that all fruit cannot be consumed in this manner.

In the case of apples, particularly, there is always some difficulty during a glut to find a satisfactory outlet. Canning is not always a profitable way of handling apples, since they are available, in these days of rapid transport, in a fresh stage during the greater part of the year. Similarly with bottling, drying, and sugar preserving, the demand is—compared with the supply—limited.

Three suggestions that present themselves of products which command a sale at all times of the year are apple chutney, apple sauce, and apple butter. They are all simple to make, keep perfectly if prepared with due care, and their delicious taste and many uses make one wonder at their apparent lack of popularity. Made at this time of the year and stored, as jam is stored, the products are ready for sale at any time when they may be called for during the following twelve months.

Apple Chutney

Apple chutney is prepared from the fresh apples, peeled, cored, and cut into pieces about half an inch cube. The exact shape of the pieces is not important so long as they are not too small. The apples, after chopping, are allowed to stand overnight and then drained from any juice that may have separated, the latter being reserved.

To every 60 lb. of apples 100 lb. of sugar is weighed out, made into a syrup with water, and boiled to 240° F. Into this syrup the small quantity of juice that may have separated is incorporated. While still boiling hot the syrup is poured on to the chopped apples in a suitable container, stirred and allowed to stand for 24 hours. The syrup and apple is then placed in a pan and boiled gently, together with chopped raisins, chopped stem ginger, and as much spice (such as mace, pimento, and nutmeg) and vinegar as taste demands, and the product bottled hot. Served with cold meat—particularly ham and pork—and similar dishes, this chutney is delightful. The colour should be golden brown, but this can be darkened if desired with a little sugar caramel. The only machinery required, apart from the boiling pan, is a chopping or dicing machine.

Apple Sauce

Apple sauce, well known in every home as the correct adjunct for roast pork and duck, and usually consisting of apples sliced and stewed with a little sugar, can be truly called a sauce if prepared as follows:

Fresh apples, as green and fresh as can be obtained, are placed in a clean barrel. A steam coil is inserted and the apples cooked for 15 minutes by contact with live steam at about 60 lb. pressure. Care should be taken to see that the steam line is drained before the valve is opened, otherwise the condensed water will enter the barrel and materially affect the consistency of the finished product.

When cooked, the apples are passed through a pulping machine, using the finest sieve obtainable.

To 80 lb. of this apple pulp in a boiling pan add 80 lb. of sugar and 5½ lb. of 80 per cent. acetic acid. Stir and cook for 15 minutes. Spices (such as cinnamon, cloves, mace, and a trace of onion or garlic) may be added to suit individual taste, and the product filled into wide-mouthed bottles.

This sauce will keep indefinitely, and, providing the spicing has been done judiciously, will prove a great favourite with all who have been led to expect that watery stewed apple is the only sauce that can be prepared from the fruit for presentation with rich meats.

Apple Butter

Apple butter, which enjoys considerable popularity in America, is a preparation of a different type, being intended as a spread for sandwiches and at the tea table, and being in fact a kind of concentrated jam.

Processes vary, but consist in the main in expressing the juice from 100 lb. of freshly cooked apples and concentrating with 70 lb. of sugar in a boiling pan to 234° F. At this point 50 lb. of apple pulp, prepared as in the foregoing formula for apple sauce, are added, together with cinnamon, clove and mace spicing, and the mass gently cooked to 228° F.

This product is very palatable and deserving of greater favour than at present it enjoys.

It will be obvious that all the foregoing products are easy to prepare and low in material and production cost, yet they deservedly command high prices from a discriminating public, and only need to be better known to earn a lasting popularity.

The Treatment of WASTE WATERS in the FOOD INDUSTRY

By THOMAS McLACHLAN, A.C.G.F.C., F.I.C.*

AS ALREADY stated, purification in the percolating filter or by activated sludge is effected by means of earth micro-organisms. Consequently, when dealing with waste liquors from beet-sugar factories, and to a certain extent with dairy refuse, it is unnecessary to seed the filters, but, whenever any doubt arises about the potentialities of cultivating a satisfactory flora, some sludge should be obtained from an actively working sewage plant with which to inoculate it.

Activated Sludge

Many authorities claim that it is impracticable to treat dairy wastes by the activated sludge process on account of the high sugar content and the consequent high absorption of oxygen, but Kessener, working in Holland and America, has devised a plant in which aeration is obtained by means of specially constructed road sweeper brooms, which rotate at 60 to 70 r.p.h. and dip about 0·6 inch into the surface of the liquid, causing a spray of about 2 feet in height to be formed. For treating a waste of 37,000 gallons per day he finds that two brushes 52 feet in length and 26 inches in diameter are sufficient. During the summer it has been found necessary to add about 40 lb. of lime for 37,000 gallons of waste on account of the rapid fermentation taking place before and during sedimentation, but this is unnecessary during the winter. If the temperature of the waste were sufficiently high at first to prevent this incipient fermentation, it should be unnecessary to add lime. An example of the extent of the purification obtained by means of the above process may be quoted from the work of Kessener and Rudolfs, working on the waste from a milk condensery.

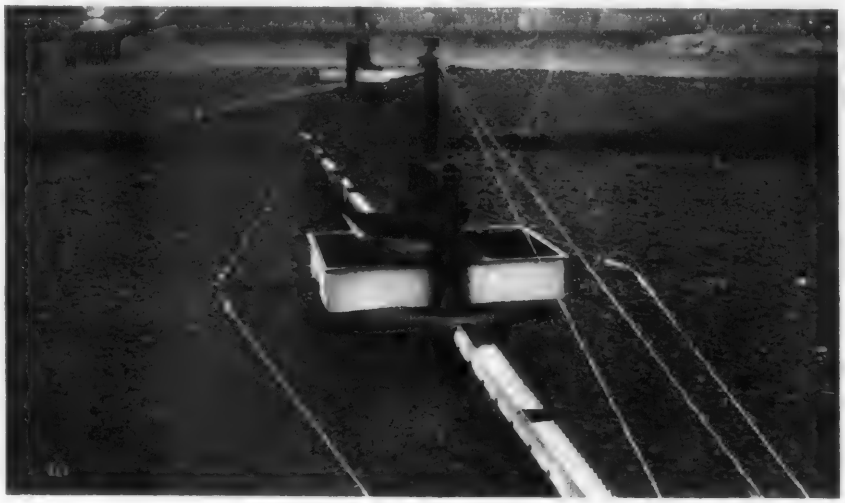
Milk wastes, starch, brewers' yeast, and sugar have been found to cause a rapid increase in volume, and consequently in the moisture content of activated sludge, and at the same time to favour the growth of filamentous organisms which have an inhibitory effect on normal sewage flora. The Chicago case, mentioned earlier, is an interesting example of this phenomenon.

The presence of carbohydrates in sewage reduces the formation of nitrates in the effluent, and whereas normal sewage may contain 0·8 to 1·0 part per 100,000 of nitrate, none is found in effluents from waters containing sugar.

J. P. Rue commented on the fact that in some industries, particularly meat-packing, the complete utilisation of all raw material and the elimination of water has become proverbial, but that in other industries the waste is still large and the problems caused thereby are difficult.

Effect of Salt Concentration on Fermentation

One frequently hears complaints that salts introduced from water softening plants or from other causes will



(Courtesy, Messrs. Tuke and Bell, Ltd.)

Close-up view of the distributor apparatus.

* Concluded from October, 1934, issue.

completely upset the working of septic tanks or waste purification processes, but activated sludge tanks work efficiently on packing-house wastes containing 225 parts per 100,000 of salt and 200 parts per 100,000 of other dissolved solids. In the case of these wastes aeration by stream flow is found to be exceedingly useful. Richards and Cutler found that, in making determinations of "Time of Contact", although they employed high concentrations of calcium chloride, the exact quantity of which they do not mention, no lasting effect was produced on the organisms in the film. Immediately after applying the salt solution no living protozoa could be found at the point of application, and subsequent examination showed that no permanent injury has been inflicted even at this point.

Conservation of Water Supplies

A problem which some manufacturers have to face and which will become even more urgent in the near future is the conservation of their water supplies. In this case we are not dealing primarily with the treatment of waste liquors for discharge, but with that of employing water repeatedly for the same purpose or for a subsequent process when it has previously been employed in an earlier one.

The commonest instance of such repeated use of water is that of the utilisation of condenser waters for boilers. With such waters the chief difficulty to be overcome is that of priming, due to the presence of globules of oil in the water, and, for this purpose, alumino-ferric and soda are commonly added. The effect is to distribute the aluminium sulphate evenly throughout the water and then to catch the oil globules in the coagulating aluminium hydroxide.

TABLE IV.—BEET-SUGAR LIQUORS

Temperature ..	17·3° C.	13·4° C.	15·1° C.	13·5° C.	15·9° C.
Parts per 100,000—					
Total solids	126·5	50·2	65·0	72·2	75·6
Loss on ignition ..	78·5	15·2	17·8	28·7	16·5
Ash	48·0	35·0	47·2	43·5	59·1
Total suspended solids	29·4	3·9	5·8	3·2	2·3
Loss on ignition ..	16·0	1·7	3·2	2·6	2·2
Ash	13·4	2·2	2·6	0·6	0·1
Total solids in solution	97·1	46·3	59·2	69·0	73·3
Loss on ignition ..	62·5	13·5	14·7	26·1	14·3
Ash	34·6	32·8	44·5	42·9	59·0
Ammoniacal nitrogen	0·125	0·02	0·02	0·05	0·065
Organic nitrogen ..	1·172	0·566	0·310	0·479	0·331
Oxygen absorbed in 4 hours	36·52	3·51	3·62	6·30	3·84
Oxygen absorbed in 5 days	59·18	8·26	8·94	18·22	11·32
Nitrogen as nitrite	0·004	0·00	0·00	0·008	0·016
Nitrogen as nitrate	0·142	0·092	0·100	0·084	0·124
Sucrose	19·54	1·23	1·23	3·29	1·23
*p*H	5·0	8·0	8·0	6·5	7·3
Appearance	Cloudy	Clear	Clear	Cloudy	Cloudy
Odour	Sour	Earthy	Earthy	Earthy	Earthy
Incubator test 5 days at 35° C.	Failed	Doubtful	Doubtful	Failed	Failed
Purification—					
4 hours' test ..	—	90·4	90·1	82·7	89·5
5 days' test ..	—	86·0	84·9	69·2	80·9

TABLE V.

	Influent.	*Effluent.*	*River.*
Parts per 100,000—			
Total solids	—	25·5	—
Suspended solids	6·3	—	—
Ash suspended solids ..	1·4	—	—
NH_3 free and saline ..	0·17	0·066	0·06
NH_3 albuminoid	0·6	0·060	0·05
Oxygen absorbed in 4 hours	7·9	0·3	0·1
Oxygen absorbed in 5 days	31·4	0·53	0·3
Nitrogen as nitrites ..	—	Trace	0·017
Nitrogen as nitrates ..	Nil	0·57	0·27
Alkalinity as CaO	8·7	7·6	6·8
Chlorides	1·8	1·6	1·4
*p*H	—	7·4	6·5

Two different types of condenser are commonly employed in the food industry: the first where the condensed vapours are collected in the condenser water, and the second where they are kept separate. The condensate itself may contain volatile compounds which render the water unsuitable for further use without treatment, but where the condenser water is kept separate all that is necessary is to effect some form of cooling. In the country, where there is plenty of space, the water may be cooled by running it into an artificial pond or lake, the level of which is kept constant and the water circulated by a pump. Where space is valuable a cooling tower may be constructed on the premises, the water being sprayed through from 10 to 50 feet in order to secure adequate vaporisation and consequent cooling of the remainder. A water tower may work quite efficiently for the treatment of condenser water, even when volatile substances are trapped in it, since, if the condenser water becomes hot, the temperature is sufficient to distil them off, and, if it never becomes hot, aerobic purification will be automatically set up. It must be remembered, however, that this condenser water can never supply all the requirements of the factory and that fresh water will be continually required. Such fresh water should always be employed for those purposes where the purest water is in demand.

In factories such as beet-sugar works I see no reason why the bulk of the water should not be utilised repeatedly, providing that the water for fluming is kept separate from that used for extraction and condensation, and that all losses in the fluming water are made up from condenser or extraction water, and that press waters are purified with the fluming water waste.

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Milk in Bread?

E. B. Bennion and F. E. Thomas return to the fray.

It seems to be a very long time ago now since we firmly announced our intention of closing this discussion, which was started almost a year ago by a controversial article from the pen of one who (perhaps fortunately for himself?) styled himself "Ignoramus." Nevertheless, Messrs. Bennion and Thomas have been anxiously waiting to have another go since the appearance of our October, 1934, issue. Read below what they have to say to Mr. Patrick J. Shortt.

EDMUND B. BENNION

MY PREVIOUS contribution to this subject was in part a summary of the meeting of the National Association of Master Bakers at Llandudno in June last and a few other remarks concerning the use of extended quantities of milk in bread. Mr. Patrick J. Shortt has apparently taken objection to some of the remarks, and in doing so has made what, in my opinion, appear to be some most inaccurate statements.

Mr. Patrick J. Shortt, as his name suggests, is of Irish extraction, having been born in Ireland. At an early age he showed signs of sagacity by emigrating to America. Realising this, we can forgive him a lot, for I am certain that controversy is second nature to him, and so long as this one proceeds, so long will Mr. Shortt be happy. True to his native love of a scrap, he seems to be making every effort to work all the other contributors in turn up to fighting pitch, and is perhaps hoping after the massacre, which might result, to revive the victims with milk bread —the real stuff with plenty of guts in it. This, of course, presupposes the survival of Mr. Shortt himself to take an active part in the final celebrations.

Mr. Shortt, true again to his native character, makes rash statements without verifying the facts. Whilst it would be possible to be extremely lengthy on this subject, it will be my object to reserve my contribution to dealing with those points of importance raised in Mr. Shortt's article.

The first question that arises from the discussion is—Is Mr. Shortt a milkman or a breadman? He says he is all for good bread—so are many people besides bakers. Good bread, however, provides a common bond, but as he is directly interested in the sale of milk powder, he enters the arena prejudiced in favour of better bread by the use of milk alone. No doubt his prejudice is the fruits of his experience, for most of our prejudices are so formed, but he must realise that everyone does not want milk bread all the time. That has been, and still is, my point of contention.

Unfortunately for Mr. Shortt, he was not present at the Llandudno Conference when Mr. Rees-Jones read his paper, otherwise he would have known that Mr. Rees-Jones was not a co-worker, but an independent worker in the same field. He must realise that there is always a likelihood of different opinions being held, otherwise this discussion would never have commenced.

Mr. Shortt accuses me of having stated in my contributions on this subject that 6 gallons of milk replaced 6 gallons of water. In none of my writings on this subject has this statement been made. Mr. Shortt must not claim all the powers of observation and deduction for himself, for there are many other people who have similar ability to that possessed by himself and are able to make similar theoretical calculations on the replacement of water by milk in dough.

Mr. Shortt and myself seem to be in agreement on the main issue, for he seems to have been able to deduce from my contribution that I realise that bread containing milk should be good bread, and not only possess good eating qualities, but good tasting properties as well. He may not know that personally I eat milk bread very often, but milk bread containing milk in the limits already stated, and not a kind of medicated milk bread.

Mr. Shortt criticises my abilities as a dietitian. There he makes a mistake, for the rôle of dietitian is one I have not adopted; in fact, I should hesitate about doing so in these days when so many people seem to consider themselves to possess ability to give advice on this subject. I have re-read my own writings, and fail to see how Mr. Shortt has so erred, unless it is because reasoned argument has been sufficiently sound to suggest the dictum of the authority!

Mr. Shortt naturally listens to those dietitians who support the views of the interests he represents, and therein he is like many other people who have to advocate specific ideas. He asks later on in his writings, "Who cares about the farmers?" following on my pointing out the fallacy in the use of milk as a means of stimulating the consumption of it at the expense of flour

in the bread. Perhaps the question might be asked of Mr. Shortt—Does he care what happens to the farmer, or is he always so sure of adequate milk supplies for his milk powder? Perhaps he hopes to make the farmer profit more from increased milk consumption and so make it possible for him to overlook losses on wheat. The farmer is to-day receiving more attention than ever from the Government, and if Mr. Shortt reads his morning paper the answer to the question will be found.

The last part of Mr. Shortt's article makes interesting reading, as the effect of increased quantities of skim milk powder on the quality and yield of bread is considered, as well as the effect of it on conservation of weight. This is apparently in answer to the question raised by Mr. Thomas and myself regarding conservation of weight and the authority underlying the statement.

It is a pity that these results are laboratory experiments and confined to pan bread only. It has already been agreed that with pan bread wrapped in wax paper after two hours' cooling a small saving can be effected, but what was wanted was evidence that cottage, Coburgs, Danish, Blummer's, French loaves, and all the other sundry shapes now produced could be scaled off at 2 lb. 3 oz. and still satisfy the weights and measures inspectors, after having been marketed in the usual way.

Further, it is a pity that Mr. Shortt has not weighed his loaves after having been left in a shop for 12 hours, or exposed on a barrow for a few hours to an east wind, such as is very frequent in many parts of the country.

I have weighed many crusty loaves containing the equivalent of 5 lb. of milk powder to the sack 12 hours after leaving the oven, and found them nearly all short weight, even though scaled off at 2 lb. 4 oz. These were from commercial batches, not experimental ones, and the loaves were of all varieties.

If bread is to be sold warm over the counter or within a few hours after leaving the oven, conservation in weight can be looked for, but such conditions are not the general ones obtaining to-day.

Everyone who has done any laboratory tests knows the difference there is in making deductions from such and deduction from actual production methods. An allowance has always to be made. Perhaps Mr. Shortt could publish a list of twenty bakeries where such savings are being effected in practice on all shapes. If so, then it will be of great help to the trade.

There are many other points which could be raised. This question of solidity of crumb in bread containing 5 per cent. of milk powder all depends on our ideas of solidity of crumb. In America their ideas of bread are very different from ours. Their bread would not sell over here to replace the ordinary water bread entirely. What would seem solidity in crumb to us may not seem so to an American. Any prolongation of this part of the argument would be futile, however, for tastes differ so much, even in such a small country as this.

Finally, it is obvious from the experience of most people that milk in bread is quite a desirable thing, and that bread containing it is most palatable for many, but if the intention is to get people to take more milk, a glass of milk (or bottle, as is done with school-children) with a nice bun or piece of toast would seem to be the best means of ensuring that the greatest increase in *per capita* milk consumption is obtained.

I still maintain that milk *via* bread as a means of increasing the food value of the diet with milk solids is not the best way for the majority of people. It can be made a small addition, but bulk consumption of liquid milk must surely prove the most effective means.

F. E. THOMAS

I am all one with Mr. Shortt as to the fun to be obtained out of an argument, and willingly accept the opportunity to carry it a stage further. I only regret that from the nature of things it cannot be extended via FOOD MANUFACTURE much longer, and there is such a lot to be said. However, we can always continue it *viva voce* if Mr. Shortt would like to do so.

I will first of all answer briefly a few of Mr. Shortt's points. He may not have heard of any milk in bread campaign in this country before, but it has been under way the last two or three years—not too successfully, which may account for Mr. Shortt's presence here. When I assume that Mr. Shortt represents only the milk vendor's views, am I wrong? Was he a baker at the time he wrote his first article, and does he not represent only the milk vendors at the moment? Is he connected practically with any bakery in this country? I stated that this campaign was designed first and foremost to benefit the farmer, and I fail to see that his argument has disproved this. The analogies he suggests are not far off the point—very similar things have happened. Of course, the middleman, too, will benefit by the campaign.

Mr. Shortt has not answered all my points, but I will deal first with his main charge of inconsistency on my part. In keeping down my original article to editorial limits I may have been somewhat elliptic. Let me explain my standpoint a little more clearly. (Incidentally I really must deprecate Mr. Shortt's method of endeavouring to establish my inconsistency by disconnected extracts. This is a recognisedly bad forensic method, and I could quite easily prove in this way that Mr. Shortt had said in his article that you couldn't use milk in bread. The context is everything.)

I endeavoured to make it clear that my attitude was an intermediate one between those who say milk is of no practical advantage in bread and those who say the more milk in bread the better. I am much more a supporter of Mr. Shortt than an antagonist, but because I approve of fairly fast cars it does not mean I am in favour of reckless driving. Extreme views on any matter are usually wrong, and Mr. Shortt's views seem to me to be of that nature. I quite agree with him as to the value to be obtained from milk proteins and minerals (though the latter could easily be made available in a cheaper form). They undoubtedly are valuable, and the inclusion of milk solids would benefit all classes except one *at the present time and in the present conditions of the bread trade in this country*. That one exception is the baker, who is expected to put large quantities of milk or

milk powder into his bread without any extra expense to the consumer, the argument being that "it doesn't cost him any more"!

This brings us to the crux of the situation, Mr. Shortt's table of costs of water and milk breads. If he would adopt the attitude that milk *does* cost the baker more—this is my contention—and therefore should cost the consumer more, and would set on foot propaganda to educate the public to this understanding, I would give him all the support of which I am capable. Let us, therefore, turn again to this chart of costs.

A chart of this kind should have been prepared with the greatest care and should have been submitted to several bread experts in this country. Obviously it endeavours to establish a very important point and will, therefore, be subject to considerable criticism and argument. Mr. Shortt dismisses my remark that he has charged 8d. a lb. for his fat instead of the market price of about 3d. to 4d. a lb. as a "quibble". I really do protest. It is an obvious error and any baker would have pointed it out. This seems to me fairly satisfactory evidence that the chart did not receive the thought and care it deserved. When you take the trouble to work out the cost of your dough per pound to five places of decimals, an error of 100 per cent. in the price of one of your ingredients is hardly of a trivial character. It satisfied me without further deep examination that the table was a theoretical one and would not work out so nicely in practice. But if Mr. Shortt wants me to criticise his table further, I have no objection. His main desire in including large quantities of milk in bread is to provide a "better, more palatable white bread". A true comparison of costs in the two cases should, therefore, be with the bread most commonly made in this country and that which he describes as "the football of contention as to its food merits". Bread of this description contains no sugar, fat or malt (the mention of sugar indicates that the table is meant to refer to American rather than British bread, as sugar is rarely used over here). This reduces the amount of dough to 436 lb. costing 27s. 8d. against 463 lb. of milk bread costing 32s. 4d. (We have given Mr. Shortt the benefit of fat at 4d. a lb. instead of 8d.) This will materially alter the cost per loaf in the two cases, but before calculating these costs, there is the question of the weight at which the dough should be scaled.

I queried Mr. Shortt's wisdom in suggesting that the milk bread should be scaled at 1 oz. less than the water bread. He counters by quoting Mr. W. Rees-Jones and some tests carried out recently at Wrexham. He prefaces his quotation from Mr. Rees-Jones' report with the remark, "Here is the most recent verse in this connection and one that will convince anyone". I cheerfully admit Mr. Rees-Jones' evidence in the matter, but even he only suggests scaling ½ oz. lighter, and not 1 oz.—again a 50 per cent. reduction on Mr. Shortt's statement. Mr. Bennion, who incidentally is not a co-worker of Mr. Rees-Jones, only a contemporary worker, which is hardly the same thing, also questions Mr. Shortt's authority for his statements concerning fermentation losses and for the scaling of 1 oz. less. In reply to this Mr. Shortt produces the figures of some tests carried out on doughs with and without the addition of separated milk powder. On paper these figures demonstrate his point, but the tests are based on a serious and fundamental fallacy, which entirely invalidates them. The tests have been done on about 3 lb. of flour, and it is impossible to draw any satisfactory conclusions from quantitative tests carried out on such a small quantity. It is not only the difficulty of accurately weighing small quantities and avoiding small losses of flour and dough on the fingers or spatulas, etc., used, but also, and this is insuperable, the fact that the doughs are so small, and consequently are mainly "all surface", means that fermentation conditions are entirely different from those taking place in bulk fermentation. You can prove absolutely nothing *quantitatively* by small-scale laboratory experiments. I don't doubt for a moment the accuracy of these figures, but a test of this kind might easily have shown results *disproving* Mr. Shortt's contention and these would have been equally valueless in arriving at the truth of the matter. It is essential to do quantitative tests on a reasonable scale, say, not less than 100 lb. of flour. It is more difficult, of course, than the laboratory method, but bread is not made on the commercial scale in laboratories, and this is one of the cases where laboratory results cannot be converted directly into factory equivalents. Mr. Shortt's figures, therefore, in my opinion and, I venture to think, in the opinion of all who have had experience of demonstrating quantitative work in laboratories and bakeries and noting the relation between the results obtained in the two sets of circumstances, have certainly not proved his case.

To return, however, to the calculation: we will be generous and concede Mr. Shortt ½ oz. reduction when weighing his milk bread and will keep to his figures for fermentation losses. With the alterations suggested above, we shall then have, in the case of

Water bread: 425 lb. net of dough, scaled at 36½ oz., giving 186 loaves.

Milk bread: 456 lb. net of dough, scaled at 36 oz., giving 202½ loaves.

The water bread loaves will, therefore, cost 1·73d. each, the milk bread 1·91d. each for raw materials—that is, the milk bread will cost 2s. to 2s. 6d. *more* per sack. I submit these figures for criticism by Mr. Shortt.

One little point in conclusion. Mr. Shortt finds it difficult to understand why I propose legislative compulsion of its use as the only fair way to the baker. It is for this reason. The forces arrayed against the baker are so strong, and he is such an unorganised fighter, that it is within the bounds of possibility that he might be forced by quiet and "peaceful penetration" to incorporate milk and other things in his bread without any recompense for the extra expense. In that case, he would find it still harder to get a decent return for his labours than at present. Even he, burdened with legislation as he is, would welcome a measure which would be as much in his favour as in that of the consumer, for he could justifiably increase the price of his bread. The baker has had too many kicks these last few years—let him have a few of the pence, Mr. Shortt.

2,000 Years Ago

The Date Palm and Date Wine*

THE Palme tree growes in Egypt. The fruit is gathered in the Autume ye ripening tyme being half ouer, like to ye Arabick Myrobalan, and it is called Poma, of a green colour, like vnto a Cydonium in smell, but if it be let alone till it comme to ye full ripenesse, it becommes Phoenicobalanus. It is sour, binding, being dranck with hard wine. It glues wounds together being anointed on. But ye Phoenicobalani, are more binding than the drie. But they cause the head-ach, and being eaten in too great abundance with meate, they inebriate. The drie being eaten with meate, are good for the stomachici . . . but especially the caryotae being eaten doe heale ye asperities of ye Arteries.[1]

Making the Wine

Taking ripe Dates, such as are called common, cast them into a small hogs-head bored through in the bottom, and stopped with a pitched reed. But let the hole be stopped with Linnen. And to ten Choinixes[2] of dates put in 3 Congii[3] of water. But if you would not have it too sweet, pour in five Congii, and so let it rest for 10 days. But on 11 taking away ye linnen cloth from ye reed, take away ye thick and sweet wine, and set it up. It is indeed sweet, yet naught for ye head, being good for fluxes, because of its binding. Whence it is fit for ye stomachicall. But some mixing the same again with water, take it, and they do this ye third time, and ye fourth and ye fifth time, when that which is left grows sour.

[1] *I.e.*, Windpipe.

[2] 48 choinixes = 52·53 litres.

[3] 1 congius = 5·76 pints.

* From *The Greek Herbal of Dioscorides.*—(Translated into English in 1655.)

TINPLATE MAKING

THE manufacture of tinplate is one of the older industries typical of South Wales. Below we show a view of the Melingriffith Tinplate Works at Whitchurch, near Cardiff, recently visited by the Editor of FOOD MANUFACTURE in company with other members of the Society of Chemical Industry.

The Melingriffith Tinplate Works was established in 1774, and at various times in its career has contributed important inventions to the industry, such as the Thomas and Davies Automatic Doubling and Shearing Machine (1923) and the Automatic Bar Boshing Machine (1932). This year the works has been acquired by Richard Thomas and Co., Ltd.

The visitors were shown the entire range of operations from the cutting of the mild steel bars to the testing and packing of the finished tinplate, and very interesting it proved to be. It was fascinating to watch the red-hot sheets of steel being run backwards and forwards through the rolls and being folded, re-heated, and passed through the rolls again. The workers engaged on these jobs perform wonders in tossing the fiery sheets from one to the other by means of long pincers, and if they were to stage this as a "turn" at the London Coliseum, they would undoubtedly bring down the house. It would leave juggling with bottles, plates, and billiard balls absolutely cold!

Pickling, too, is an awe-inspiring operation, and would strike envy into the hearts of the African witch doctors. It occurred to us that this part of the proceedings might well be recommended to those movie companies who are looking round for suitable background for rich melodrama.

We saw the black and the white annealing operations and the rolling processes which imparted a wonderfully smooth finish to the sheets, and we also watched the ingenious, patent Thomas and Davies Automatic Pickling, Tinning, and Cleaning Machines at work.

Altogether it proved to be one of the most interesting works visits we have ever made, and Messrs. Richard Thomas and Co., Ltd., well deserve the hearty vote of thanks accorded to them at the conclusion of the visit.

View of the Melingriffith Tinplate Works, at Whitchurch near Cardiff.

LIQUEUR CHOCOLATES

By
N. F. SCARBOROUGH, A.M.I.MECH.E.
(Author of *Sweet Manufacture*)

THE MANUFACTURE of liqueur chocolates, by which is meant those having liquid or semi-liquid centres and having the flavour of various liqueurs, comprises several different processes, some applicable to the smallest factory and others only possible for the largest and best equipped plant.

At the outset it is well to note that, at any rate as far as the United Kingdom and the United States of America are concerned, the production of a genuine liqueur chocolate is illegal, owing to the prevailing Excise regulations which forbid the sale of sweetmeats containing alcohol. The various essence manufacturers are, however, well alive to the situation, and have produced ranges of flavourings which simulate with fair accuracy the various well-known liqueurs, and it is on these that the manufacturer will have to rely.

The simplest process in the production of suitable centres for covering with chocolate consists in preparing a sugar solution of proper density, coloured and flavoured, possibly reinforced by the addition of a gum such as arabic, and casting this into starch moulds in order to obtain a crust on the centre sufficiently strong to permit of gentle handling. In some cases the crust is strengthened by crystallising in cold syrup, and if the whole process is correctly performed, both the original crust and the outer crystallised layer subsequently redissolve after covering, leaving no trace of their existence.

Method I

The following is a suitable formula for the production of centres by this method:

Take a suitable quantity of white sugar and halve the batch. Syrup one half in water using 1 pint to 3 lb. sugar, and allow to cool, either covering the surface with paper or wetting it to prevent a crust forming. Boil the remaining half of the sugar with 1 pint water to 3 lb. sugar to 246° F. and add the cooled syrup from the previous operation. Add gum arabic solution composed of 5 parts of gum and 8 parts of water by weight at the rate of about 2 lb. solution per cwt. sugar in all, together with the necessary flavourings and colourings. Deposit in starch and dust over the tops, taking care to cover each impression completely. Stack in a cool place until the crust will permit of light handling (about 4 to 5 hours) when the deposits should be carefully turned over. Leave for a few hours and, when sufficiently strong, crystallise in cold syrup of 34° Beaumé (at boiling point) for 8 to 12 hours. The centres are ready for covering as soon as drained and dried. The usual precautions for covering must be taken, otherwise trouble with bursting or weeping centres will be experienced, and the centres should be allowed to warm up in the covering room for a period or subsequent expansion will cause bursting and leakage.

Method II

A second method, giving a flowing cream centre and depending on the action of cream of tartar on ordinary fondant, is frequently employed. In this case the base consists of a soft fondant produced from white sugar and glucose in the proportions of 6 to 1, boiled to a temperature in the region of 235° F. The fondant should be well beaten, and it should be matured for some hours before use in closed vessels or under damp cloths. After maturing, the fondant should be warmed gently and carefully to soften it. Overheating is to be avoided. It should be remembered that fondant is a bad conductor of heat, so that it is easily possible to overheat the part in contact with the pan while the centre of the mass is still solid and cold.

When the fondant is soft prepare a sugar syrup by boiling white sugar and cream of tartar in the proportion of 1 oz. of cream of tartar to 56 lb. of sugar. The syrup is then added to the fondant in equal proportion by weight together with the required flavours and colours, and at the same time glucose at the rate of 8 lb. per cwt. The chief point to watch in this method is the avoidance if possible of any reheating of the batch after all the ingredients are amalgamated, and the prior softening of the fondant base is generally sufficient to overcome this. In addition, the glucose may be warmed, together with the utensils if necessary. The batch should be deposited into good dry starch without delay, and left for a few hours before cleaning and covering.

Method III

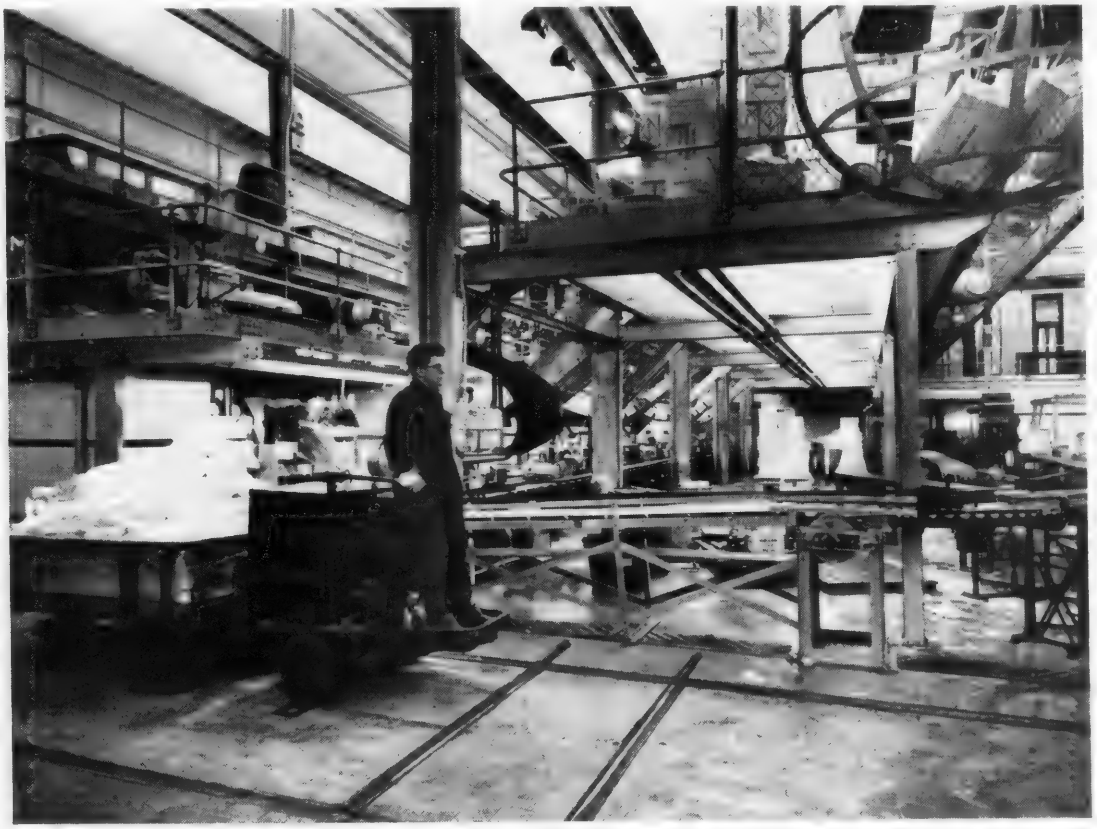
A third method consists in the use of ordinary fondant treated with an invertase which gradually softens the fondant after casting, but allows a sufficient margin for re-moulding and the subsequent chocolate coating. The process is protected, but a suitable invertase is available under licence for use in this particular connection. It is

possible by this method to add real fruits, preserved in syrup, to the centres, and these, besides vastly improving the flavours obtained, assist still further in liquefying the fondant; centres may be obtained almost totally fluid after the necessary storage period has elapsed. Bursting or weeping occurring within two or three days from covering can generally be traced to some error in the purely mechanical aspect of covering, namely that for some physical cause the covering has been ruptured. Too cold centres, expanding as a result of their rising temperature after the chocolate covering is set, are a frequent source of trouble, as is excessive chilling to set the covering. Where moulded work is under consideration the temperature of the moulds at filling should be watched, and this should be kept as high as possible without detriment to the surface finish of the goods. In its second form the bursting or weeping does not usually appear for some little time after covering, probably from 10 to 15 days or more, and in this case it is fair to assume that some form of fermentation is the cause. A cure can usually be effected by speeding up the inversion process and getting quicker liquefaction of the centre. When made, the density of the syrup fraction in the fondant is low enough to permit fermentation, and, until a sufficient amount of the solid sugar has entered into the syrup to make it concentrated enough, the danger continues.

Method IV

A fourth method of production depends on the use of moulds in which partly finished hollow shells are made, to be filled and sealed off at a later stage in the proceedings. The sequence of operations may be carried out entirely by hand, or machines exist that will perform the whole process almost unaided. The moulds at a suitable temperature are filled with melted chocolate and when a sufficiently thick shell has been formed the still liquid centre is poured or shaken out, leaving the shell to be cooled and finally set. Alternatively, a pre-determined amount of chocolate is measured into the mould which is rotated in all directions until a film covering the entire surface is obtained, when it is cooled. The fillings are then inserted in the shells, which are sealed by the application of more liquid chocolate to the opening. This may be applied by hand or by mechanical deposition. It may be necessary in some cases to pre-heat the edge of the existing shell so that the sealing may unite properly with the main body.

No attempt has been made to deal with the actual work of covering, either by hand or machine, or the questions of temperature, refrigeration and so forth that play a great part in the production of all classes of chocolate work, as these factors are, or should be, well known to anyone handling such work.



A view taken in the Unilever margarine factory at Purfleet on the occasion of a recent visit of the Society of Medical Officers of Health. On December 15 members of the Biochemical Society paid a visit to the margarine factory at Bromborough near Liverpool, and later to the Unilever Nutrition Laboratory, where demonstrations were given of the estimation of vitamins A and D.

SUGAR LOAVES

No attempt has been made to include in this account a general description of the production of sugar. We have had several enquiries in the past asking us to describe the preparation of conical sugar loaves, and this, together with refining the loaves, is covered in the present article. It is assumed that the preliminary stages will be familiar to anyone intending to make sugar loaves.

THE LIQUOR on leaving the charcoal filters is run into another tank which supplies the charges to the vacuum pans. The liquor is evaporated at a temperature of 77° to 82° C. during the first part of the process, the temperature being reduced to 63° C. as soon as crystallisation is sufficiently advanced. Whilst the concentrated liquor is still sufficiently fluid the charge is let down into a heater where the temperature is raised to 83° C. and the liquor is kept in motion to prevent the formation of crystals of too large a size until crystallisation is complete, when the moist crystalline mass is drawn off into large copper ladles and transferred direct to cast-iron conical moulds for making loaf sugar. These are coated with a varnish or glaze, or may be painted with white lead paint, and there is a hole in the apex of each mould which is kept plugged up at first. The liquor should be poured in at such a temperature that the formation of crystals is just commencing, as it is desired to produce a fine grain or regular conglomeration of crystals. As the larger the bulk of the syrup the slower will be the cooling and the more regular the crystallisation, larger moulds are used for bad syrups which crystallise with greater difficulty, and smaller ones for syrups likely to produce too coarse a grain.

The moulds, when filled, are removed after having been left standing for some hours to drain and solidify, and are placed in a room maintained at a temperature of 38° C.

The sugar has a tendency to crystallise at the sides of the mould first and also to form large crystals on the surface, so the syrup is stirred up in the moulds twice with half-hour intervals, using a spatula or knife-like wooden tool.

The crystals are thus equally diffused through the thick syrup and provide points for uniform crystallisation. A compact network of small crystals is formed, the meshes being filled up with mother liquor or saturated solution which is of such a viscosity that it drains off with great difficulty. The moulds are stood apex down in receptacles to catch the drainings of syrup, and, the plugs having been removed from the holes, are left for 24 hours. When drainage tends to stop, the loaves are loosened in the moulds by reversing the latter, after which the syrup again runs off more freely. The green syrup which drains off runs through a system of gutters, and is collected in a tank or receptacle from which it is removed daily. After about four days the loaves are almost free from molasses except at the extreme ends.

The drained loaves are removed from the moulds, the coloured apexes are cut off and remoulded, and the loaves when trimmed and dried form a commercial product.

Refining

The sugar loaves thus produced are not, however, of first quality. Some molasses remains entangled between the crystals and consequently the colour is not pure white, nor have they the dryness and firmness of texture desirable. A further purifying operation is required.

This is effected by pouring upon the loaves, after they have been drained as described previously, a clear saturated solution of sugar which passes through them, the operation being repeated several times until the remaining molasses is removed and the desired amount of decolorisation obtained, when they are transferred to a drying stove heated to 54° to 60° C., in which they are kept for two or three days until baked thoroughly dry. The sugar produced in this manner is of first-rate quality.

The secondary product, consisting of the various syrups resulting from the drainage from the moulds, is again concentrated by boiling and lower grades of sugar are made therefrom, the uncrystallisable portion remaining after the final operation being treacle or syrup. In some works these syrups are added to the water employed for dissolving the next charge of raw sugar.

At one time final decolorising of the loaves was effected by *claying*. The loaves are removed from the moulds, and the base of each loaf scraped out for the reception of clay paste, which is inserted 1 lb. at a time in a layer about $\frac{1}{8}$ in. thick.

The clay used is of the white pottery variety, not so fat as to retain a very large quantity of water, and thoroughly washed to remove soluble matter. The clay is applied to the loaves while still in the moulds, and the water from the clay forces the molasses before it, becoming converted into a saturated solution of pure sugar by the dissolving of some of the crystals, further portions of water forming still purer solutions, all of which percolate through the loaf, carrying off the mother liquor and the colouring matter, which, passing down the apex, slowly disappears.

The crystallised network of sugar, which is almost pure, becomes thus impregnated with a solution of pure sugar which cements the crystals together, and gives to the loaf the desired solidity in drying. It is usual to remove the clay once during the course of the operation. The drainage from the loaf is known as clayed syrup.

The advantages of using a pure saturated solution of sugar over the claying process are that no crystals are dissolved, and no foreign ingredient is introduced into the sugar loaf.

The moulds used for sugar of the highest grade contain about 30 lb. of the granulated mass, from which

some 10 lb. of syrup drains off. The 20 lb. left is reduced to 17 lb. on drying or to 11 lb. if claying has been resorted to.

The inferior syrups are crystallised at higher temperature and these syrups are much more slowly cooled. In the larger or "bastard" moulds used for second quality sugar, 60 lb. of granulated sugar will lose 25 lb. of molasses, the 35 lb. left being reduced to 32 lb. on drying, which, after further treatment and drying, leaves only about 17 lb. of commercial product. The whole process lasts 35-40 days for best quality and longer for inferior.

Alternative Methods

In Steffen and Langen's process, the loaves in the moulds are treated with cleansing liquid under pressure. The operation is completed by forcing compressed air through the loaf, and the latter is subsequently further dried in a centrifugal.

In another method the apexes or points of the moulds are placed with their apertures arranged to communicate with a pipe, and by applying a vacuum the pressure of the atmosphere on the base will expel the molasses from the loaves.

Van Goethem uses a horizontal wheel adapted to receive 50 sugar loaves radially. This is rotated at 800 revolutions per minute, the clearing solution being meanwhile supplied automatically. About 20 minutes suffices for expelling the molasses and blanching the loaves, which finish up practically dry. (Taken from *Sugar Machinery*, 1924, by A. J. Wallis-Taylor.)

ANALYSTS AND FISH PRODUCTS

Abstracts of Papers read at the recent Joint Meeting of the Society of Public Analysts and the Food Group of the Society of Chemical Industry

The Composition of Fish Pastes

By H. E. C x, D.Sc., F.I.C.

A summary of analytical data for the edible portions of the common fish was given in a series of tables, and the figures were contrasted with those obtained in the analysis of different brands of commercial pastes bearing the names of specific fish. Most of the samples of paste examined contained starch, and in the method of calculation tentatively adopted this was calculated into moist bread (with 40 per cent. of moisture). The nitrogen corresponding with the amount of bread was deducted from the total nitrogen, and from the residual nitrogen the proportion of fat-free fish in the paste was calculated by the use of the average nitrogen figure for the fish in question. Fat in excess of that natural to the percentage of fish indicated usually denoted the use of a fatty-fish basis, such as salmon, which was a common constituent of crab, lobster, and shrimp pastes. The normal proportions of salt and water were also calculated from the fish basis, and any excess was noted.

Note on Fish Pastes

By C. H. Manley, M.A., F.I.C.

It is suggested that products sold under such names as "potted salmon" should be free from starch filling material, and a case is cited in which a Stipendiary Magistrate recognised this distinction between "potted salmon" and "salmon paste".

Some Observations on the Amounts of Amines and Free Ammonia in Fish Products

By D. H. F. Clayson, B.Sc., F.I.C., and L. H. Lampitt, D.Sc., F.I.C

Of the five chemical tests used by Foreman for the detection of incipient changes leading to putrefaction, that based on the determination of the volatile bases has been found to be the most effective for fish. No correlation with the bacterial count could be established, but it was found that the results obtained by this chemical test agreed closely with the judgments of the freshness of fish based upon the odour and the palatability after the corresponding periods.

Fish Oils and their Vitamins

By Norman Evers, B.Sc., F.I.C.

The definition of cod liver oil and the possibility of distinguishing it by chemical and physical tests from other fish-liver oils was discussed. The suggestion was made that an admixture of other fish-liver oils should be permitted, and that the oil should be defined by its vitamin content and chemical and physical characteristics rather than by its source. The analysis of fish-liver oils was discussed from a general standpoint. Analytical figures were given for a number of halibut oils, and it was shown that there was a seasonal variation in the vitamin A content of this oil.

Some Observations on Methods of Estimating the Degree of Preservation of White Fish

By G. A. Reay, Ph.D.

In comparative experiments on the tests for the freshness of fish preserved in ice it was found that smell was as sensitive as the bacteriological test and more sensitive than the chemical test. The fish had a fresh smell for about 7 days, a stale odour after 10 to 12 days, and a putrefactive odour after 15 to 20 days, whereas there was no significant increase in the volatile nitrogenous compounds until after 12 days. The newer methods of preservation by means of carbon dioxide and freezing extend the period of freshness by about 10 days, but at the expense of the quality of the flesh, which is blanched after three days. Some of the criteria commonly applied to fish preserved in ice are, however, no measure of the palatability of frozen fish.

The Identification of Common Edible Sea Fish

By C. H. Hattersley

The distinctive features of 21 species of white fish were demonstrated on actual specimens, including several kinds liable to be substituted for one another, such as lemon sole, Dover sole, plaice, megrim, dab, and witch. Among the characteristics to which attention was directed were the colour, the number and position of the fins, the size of the head and of the mouth, the position of the eyes, the texture of the skin, and the shape and colour of the lateral line.

BOOK Reviews

Viruses

ALTHOUGH an enormous amount of work has been directed to the investigation of the nature of and diseases caused by filterable viruses, the literature relating thereto is scattered through somewhat obscure journals and is consequently relatively inaccessible to the general reader. An extremely useful task has therefore been performed by Dr. R. W. Fairbrother, Lecturer in Bacteriology and Assistant Director to the Public Health Laboratory of Manchester University and late Research Fellow in Bacteriology of the Lister Institute, in presenting a general survey of our present knowledge on this subject in the form of a small volume entitled *Handbook of Filterable Viruses.*

The author deals with the development of the subject historically, the nature of viruses, their cultivation and microscopy, epidemiology and immunity, classification, and the various diseases which may be attributed to them. The matter is presented in an admirable fashion and makes interesting reading.—*Handbook of Filterable Viruses. By R. W. Fairbrother, M.D., M.R.C.P.* 193 *pages.* 1934. 7s. 6d.

H. B. C.

Maize

WE have received a booklet of 60 pages on the economics of maize, published for the Imperial Economic Committee by H.M. Stationery Office, on September 21, at the price of 1s.

This report gives general information and statistics relating to production, imports, exports, types of maize, uses in agriculture and manufacture, marketing, and so on.

We are told that while potato farina is much used in glucose manufacture on the Continent, the amount used for this purpose in the U.K. is small. Here the manufacturer uses chiefly maize starch, and that derived from flat white dent maize is preferred. Its size makes it easy to handle and its colour means that an initially white starch is secured, though glucose made from yellow maize, after decolorisation, is indistinguishable from that made from white maize.

Food Analysis

Aids to the Analysis of Food and Drugs. By Moor and Partridge, revised by J. R. Nicholls. Pp. 322. 5s.

At the time of Mr. Partridge's death last year this handy little book had been out of print for some time and he was actively engaged in preparing a new edition, the fifth. The publishers therefore asked Mr. Nicholls of the Government Laboratory to complete the revision on their behalf. In the preface it is stated that the book is not intended merely as a cram book for students, but is intended primarily for practising food and drug chemists. The result is that one might almost describe it as a recipe book with a certain amount of the underlying principles thrown in, and for this purpose it is of the greatest utility to the practising chemist, who may not always be a specialist on a particular commodity. In fact it is refreshing in these days to be able to pick up a book and find one, instead of half a dozen or more, methods recommended, even though one may be advised to refer to the literature in order to obtain fuller details of the process, though, speaking generally, sufficient information is given for most practical purposes.

Seeing that the book has appeared within eight months of Mr. Nicholls having been approached, one would naturally expect to find that it lacks that considered balance which would be present if he had had sufficient time to study the problem as a whole rather than in parts, and one must make an allowance for this and hope that a sixth edition will be forthcoming in the near future, in which these imperfections will have been corrected. A considerable amount of fresh material has been added, as shown by the large quantity of pruning which has taken place and the necessity for an extra 60 pages over the last edition, the increased space being occupied largely with information on preservatives, colouring matters, poisonous metals, and references to various Acts of Parliament and the requirements of the Dominions. With regard to this last subject the book more than upholds its reputation.

As a whole one can only congratulate Mr. Nicholls on the devotion he must have given to his task and advise all connected with the food industry to see that this little book occupies a niche on their shelves, for it is impossible to think of anyone who will not find useful information in it which will be required at some time or another. Obvious printers' errors appear to be entirely absent, although one notices both vitamines and vitamins in different parts of the book. The type is clear and the headings in bold print have been carefully selected.

The only definite criticism which one ventures to make is to ask the reviser and the publishers whether the time has not now arrived when it would be better to omit the section dealing with drugs of the Pharmacopœia. The question of the analysis of drugs is far too intricate a subject to be dealt with as a postscript to a book on food and, although a brave attempt has been made to tackle the problem, one is left with the impression that the B.P. is so well arranged that it may be left to look after itself and that another monograph might well be devoted to drugs without undue overlapping.

T. McL.

Examination of Wines

THE publication of small books, each covering briefly the analytical methods usually employed in a specific industry, is an idea which would be heartily welcomed by busy chemists. A collection of such routine methods, clearly and concisely expressed, is of great value to chemists in the particular industries concerned as well as to others who require information quickly regarding the tests employed in various manufactures. Alternative methods and more elaborate treatment can be obtained by consulting the appropriate chemical literature providing time permits and circumstances justify the necessary research.

Cruess, Joslyn and Saywell, in their *Laboratory Examination of Wines and Other Fermented Fruit Products*, have produced a small book which exactly fulfils the above requirements. In some 25 short chapters they have covered every phase of the fermented fruit industry from the point of view of regular routine tests as well as including other very useful information. The extent of the subject matter is shown by the following headings—composition of fruit juices, Balling or Brix test, the Abbé refractometer, total acidity of juice, composition of wine, specific gravity of wine, Federal standards and regulations, determination of alcohol, cream of tartar, volatile acidity, determination of extract, determination of sugar, determination of mannite, tannin and colouring matter, determination of sulphur dioxide, iron determination, use of colorimeter, microscopical examination, clarification, filtration, incubation, pasteurisation, blending, and the final chapter gives references for collateral reading. The methods are set out in a manner which is easy to follow, and while full instructions are given in each case, no unnecessary details are included. Naturally all of the information refers to American practice, but little of this is inapplicable to chemists in this country, and it will be of great interest particularly as more attention is now being paid to the production of wines over here.

This excellent production is an example of the type of book which would be appreciated in many industries, and the reviewer hopes that specialised analysts in various branches of food manufacture will compile brief and yet comprehensive works incorporating routine methods which experience has proved to be suitable and trustworthy.

H. M.

Industrial News

B.A.C. SCOTTISH SECTION—CREAM IN METAL TUBES—MAKING CANS—ANOTHER MORDEN FACTORY—THE SCIENCE LIBRARY—SULZER TECHNICAL REVIEW—PARIS INTERNATIONAL TRADE FAIR—WORLD'S LARGEST CHOCOLATE PACK?—SOUND AMPLIFYING EQUIPMENT

B.A.C.—Scottish Section

A highly successful meeting of the British Association of Chemists was held at the Royal Technical College, Glasgow, on Friday, November 2, when Prof. E. C. C. Baly, C.B.E., F.R.S., delivered a lecture on the Photosynthesis of Carbohydrates. Prof. G. G. Henderson, of Glasgow University, took the Chair.

In his usual racy style Prof. Baly gave a very living account of some of the enormous difficulties and setbacks which had been overcome up to the present, and, in addition to pointing out what had so far been achieved, he indicated some of the problems of science which he hoped might eventually be solved by his work. He hopes he may be able to throw some light on the vexatious question of how life began.

About seventy people were present, including a large number of students,

"Refreshments were served."

and the discussion, although short, served to emphasise how important the subject was not only to science but also to philosophy.

After the lecture refreshments were served and everyone agreed that Prof. Baly had succeeded in making what might have been an abstruse academic subject into a most interesting and understandable lecture.

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We have received an attractively got up brochure describing the new home of Messrs. Pinchin, Johnson and Co., Ltd., at 4, Carlton Gardens, London, S.W. 1.

Special consideration was given both to the comfort and efficiency of the staff in planning the building, and the result is fully in keeping with the dignity of this world-famous firm.

Cream in Metal Tubes

Cream in tubular containers holding a sufficient quantity for one cup of a beverage and selling at a low price has recently been placed on sale in Germany. The container is made of aluminium foil and can stand upright, and it is sealed somewhat in the manner of toothpaste tubes. It is claimed that the contents will remain in first-class condition for a minimum of three months. The tubes hold up to 70 gm. (2½ oz.), the quantity being varied according to the prevailing price of milk and cream.

▼ ▼ ▼

We have received from Messrs. J. F. Macfarlan and Co., three very interesting products—viz., gingerin (oleo resin), capsicin (oleo resin), and capsicin (soluble). The oleo resins are more fluid in appearance than others we have handled, but as the strengths are in no way lessened the greater fluidity is of definite advantage. In fact, the particular method of preparation carried out by Messrs. Macfarlan increases the solubility, which is useful. The soluble capsicin goes into solution easily.

Tests regarding strength and flavour in beverages and other foodstuffs gave excellent results and ease of incorporation was particularly noted.

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As before, FOOD MANUFACTURE and its associated paper *The Food Industries Weekly*, the newspaper of the food industry, will be the only food journals exhibiting. Our stand will be in the same place as last year.

We shall be very pleased indeed to see all our readers at the Exhibition.

Mr. W. H. Hodson

Our readers will regret to learn of the death of Mr. W. H. Hodson, partner in the firm of Oliver Ashworth and Co., of Radcliffe, near Manchester.

He passed away on November 1 in Manchester Royal Infirmary, aged 32 years, after an illness lasting 19 weeks.

Making Cans

We have received, in the form of a brochure, a most interesting description of food can production from Messrs. E. W. Bliss Co., Pocock Street, Blackfriars Road, London, S.E. 1. A short *résumé* on the history of canister development is followed by a detailed description of the cans and the making of can ends by modern high-speed methods. The very complete range of Bliss high-speed can-making machinery, including gang slitters, body making and soldering plant, machine for eliminating flats and crimps, flangers, automatic double seamers, scroll shear, strip feed presses, etc., is fully described in the second half of the brochure.

Another Morden Factory

Work is in progress at the Morden Factory Estate, Merton, on the erection of a large new warehouse and depot for Messrs. Charles Douglas and Co., Ltd., wholesale provision merchants.

The new building will have a ground floor of 12,000 ft. super, with offices facing the estate road. In addition, a large garage is to be erected to house a number of lorries, and there will be a reinforced concrete loading bank at the north end of the warehouse. The building contract is in the hands of Messrs. Commercial Structures, Ltd., of 38-44, Canal Road, Kingsland, N. 1, and it is anticipated that the new premises will be ready for occupation in February.

The Science Library

It has been estimated that about 750,000 important scientific and technical papers are published annually in about 14,000 periodicals, while the more important separate books published in these subjects number also about 14,000 in a year. Of these the Science Library acquires some 8,500 current periodicals, together with a selection of the more important works, bringing its total annual accessions to upwards of 40,000 volumes and parts.

The Science Library is the National Library especially devoted to Pure and Applied Science. It is open free to the public, practically without restriction. The Library is now a branch of the Science Museum, but has grown by purchase and numerous donations from an initial nucleus contributed in 1843 by Sir Henry de la Beche, the first Director of the Geological Survey of Great Britain and Museum of Economic Geology. All the books in the library of the Museum of Practical Geology not essential for the use of the staff of the Geological Survey were in 1883 amalgamated with the books on science in the Educational Library and formed the Science Library. A complete set of the specifications and abridgments of the Patent Office was added in 1886.

Since 1883 the scope of the Science Library has comprised mathematics, the natural and physical sciences, and their applications. The Library has become noted for its exceptionally extensive collection of the periodical literature in which is recorded the results of original observation in pure and applied science. It aims at approaching as nearly as possible the ideal of a complete subject-index to all this literature, and has adopted for this purpose the Universal Decimal Classification, the new edition of which is so minutely subdivided as to contain a place for almost every concept that has been, or is likely to become, the subject of scientific or technical discussion.

In order that the widest use of the books in the Library may be made books are lent to approved institutions at which scientific research is carried out. The Library now lends to Museum Officers, the teaching staff and research students of the Imperial College of Science and Technology, officers of Government Departments, to research workers through the medium of Research Institutions, Scientific Societies and Universities to which they belong, and through the National Central Library to the general public. Photostat copies of articles are supplied on repayment.

"Quick-Way" Map

Time wasted in the busy streets of London by transport drivers will be reduced when the "Quick-Way" Map through to London is universally used by all drivers.

This is just the thing which will give to all drivers that extensive knowledge of the side streets and short cuts which makes the drivers

"Time wasted in the busy streets."

of taxi-cabs and newspaper vans the envy of all motorists who so often lose time in London's traffic "jams".

It is published by Geo. Philip and Son, Ltd., 32, Fleet Street, E.C. 4, at 3s. 6d.

We think a sectionised edition would also be an advantage.

Sulzer Technical Review

The principal article in No. 3 of the *Sulzer Technical Review* is the paper entitled "Welding for Pressure Vessels" read by Mr. Robert Sulzer before the Institute of Marine Engineers, London. The three following articles describe the dry coke-cooling plant at the Ford Works, Dagenham, near London, an hydraulic energy storage plant in the Pyrenees and a meat freezing works in the Argentine.

Two recently ordered large Sulzer Diesel engines for an Italian motor passenger liner, a Diesel-engined power station installed 50 ft. below ground level in a building in Paris, and further Diesel-electric power stations in Greece and Java are briefly discussed, and further notes deal with a Sulzer electric boiler plant in Italian spinning mills, boiler feed pumps for 78 atm. working pressure, a large upright water-tube boiler plant, welded beer tanks of stainless steel, an ice factory in the Argentine, and a borehole pumping plant in South Africa.

The number contains as usual a four-page supplement giving extracts from articles on Sulzer manufactures which have appeared in the press during the last three months.

Numerous really excellent illustrations add much to the value of the articles and notes.

Safe Milk Bottled for Children

The first public demonstration in this country of the Satona carton making and filling machine took place at the Independent Milk Supplies, Ltd., Rossmore Road, N.W. 1, a few days ago.

This remarkable machine enables milk to be distributed in hygienic and germ-proof cartons, and will no doubt be a great safety step in the Government-supported milk-in-schools scheme.

Watching the demonstration in our photograph below are (left to right) Mr. Allen (National Milk Publicity Council), Dr. Porter (M.O.H., Marylebone), Mr. Norgaard (Danish Legation), and Dr. Orr (M.O.H., Ealing).

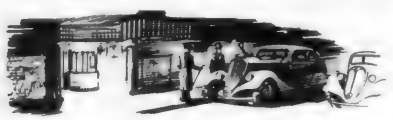
Watching a demonstration of the new carton making and filling machine.

Paris International Trade Fair

It is highly desirable for the British manufacturer to keep in touch with the Continent and to keep himself up to date as regards trade conditions, whether he finds actual business to-day easy or otherwise. This is probably one of the main reasons why the Paris Fair should have enjoyed what is actually a considerable "boom" in times when trade interchange is so exceptionally difficult.

Nearly 2½ million people visited the Fair in 1934, a very considerable increase on previous attendances, and the number of exhibitors increased from 7,800 to 8,000. Interest in the Fair from England, although naturally limited severely by trade conditions, was surprisingly great, so much so as to encourage the Fair authorities to open a special office in London. This has been operating for some months at 17, Tothill Street, S.W. 1. Here full information regarding the next Fair, which is to be held from May 18 to June 3, 1935, is being supplied.

No doubt the attractions of Paris in the early summer, combined with the fact that the Fair is one of the least expensive of Continental trade gatherings in which to participate, account largely for the considerable interest that is shown in it by both



"The attractions of Paris."

British exhibitors and buyers—an interest that has been noticeably increasing from year to year, and which will undoubtedly grow in the future.

In order to secure good positions prospective exhibitors should send in their applications for space within the next two months or so.

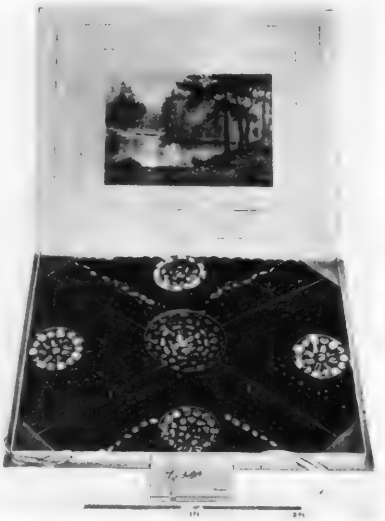
World's Largest Chocolate Pack?

Our photograph in the next column shows a very interesting chocolate pack prepared by Messrs. Fullers, Ltd., in response to a special order from a Watford customer.

The box is a single-layer one, the interior dimensions being 44 in. by 34 in., and although the design and filling of so large a pack naturally presented many difficulties, the finished casket was a great success, and certainly seems to have a strong claim to the title of the world's largest single-layer chocolate box.

Over 900 chocolates (slightly over 20 lb.) were used, of the 5s. a lb. variety, those within the circles being specially wrapped in tinfoil to tone with the general colour scheme.

The box is lined in mauve, with



gold division strips, and mauve ribbon (the customer's favourite colour) is used throughout.

The water-colour in the lid is an original artist's painting, measuring about 16 in. by 11 in., and cost £3 3s. It is mounted in a 9-in. gold surround.

The finished box, with its outer case, weighed over half a hundredweight, and required two men to lift it.

A good idea of the size is given by the 2-ft. rule and the standard small "Belvedere" pack in the foreground.

Glass Enamels and Food Equipment

One of Scotland's newest industries was referred to by Dr. E. E. Geisinger when addressing a joint meeting of the Glasgow Sections of the Society of Chemical Industry and the Institute of Chemistry in the Royal Technical College, Glasgow, on November 30.

Dr. Geisinger was speaking on "Developments in Glass Enamels and Their Industrial Application" and in outlining the varied uses found for enamelled metal ware, he said that glass enamelled steel equipment could be found in nearly all industries where storage or processing receptacles were required. It was without doubt the equipment material which had the fewest limitations. When the size of the unit was around 1,000 gallons or over the price of the equipment per unit gallon was a recommendation, whilst for smaller units the quality and freedom from any contamination of the product being processed was much in the favour of enamelled metal ware. Glass enamelled steel could be heated and cooled severely without damage, and its smooth surface allowed of easy and thorough cleaning; in addition, it could be adequately sterilised.

Glass enamelled metal was ideal for the storage of liquids, and for neutral liquids like beer or milk the size of the tank was only limited by the size of the enamelling furnace and storage facilities. Present-day glass enamels contained no ingredients of a poisonous nature like lead, antimony, or arsenic. Enamelled metal ware also resisted corrosion, and one of the most permanent protections for steel was a coating of fused silicate glass.

Earlier in his address Dr. Geisinger had dealt in some detail with the physical and chemical compositions of these enamels and had explained the modern processing of silicate coated metal ware.

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Readers should note that the Buffoline Noiseless Gear Co., Ltd., have recently moved. Their new address is North Circular Road, Cricklewood, N.W. 2 (Tel. Gladstone 6241).

Sound Amplifying Equipment

One of the largest, if not the largest, sound amplifying installations to be carried out in this country has recently been completed in the five stores of Messrs. Lewis's, Ltd.

The contract for the equipment, which was to the specification of Messrs. Lewis's Chief Engineer, Mr. Oscar C. Waygood, M.I.E.E., was entrusted to the British Thomson-Houston Co., Ltd., and included the necessary equipment to provide music to customers and staff in each of Messrs. Lewis's stores at Liverpool, Manchester, Glasgow, Leeds, and Birmingham.

In each case the store is equipped with BTH 120 watt undistorted output equipment, comprising two 40 watt and two 20 watt amplifiers which, together with input and output control panels, are located in a small studio.

A novel feature is that all the stores can be interconnected by telephone lines and a common broadcast made from any one to all stores.

Illustrations showing some of the equipment will appear in our next issue.

Slump in Turtles

The export trade in turtles to Britain from Ascension Island and St. Helena, is declining, and last year only 48 were shipped, compared with hundreds in the past.

"Hundreds in the past."

INFORMATION and ADVICE

Icing—Cream Canning—Cereal Foods—Almond Meal—Peanut Butter—Dried Yeast—Diabetics—Caffeinless Coffee—Jam Making—Polishing Raisins—Pickling—Tomato Chutney—Soya Casein—Eels in Glass—Potted Shrimps—Cream

Icing

1,758. *Some time ago I sent you a query relating to an icing for a chocolate cake mixture and you were kind enough to reply with a short article in your issue last June. I was unfortunately not able to derive any benefit from the information supplied by your contributor, because the principal point that must be borne in mind is that I want to put up an icing in* powder form *which the consumer has to prepare in some* simple *manner. As mentioned in my previous letter, I am using a powdered mixture of cocoa and icing sugar at present, which answers perfectly, except that the icing loses its gloss. I am writing again on the same subject because of a note bearing on it that appeared in your October,* 1934, *issue (page* 357, *first column, bottom paragraph). There you imply that there are materials that will cause chocolate icing to retain its gloss. Do you know of any* powdered *material that could be added to my present icing mixture to serve this purpose?* (England.)

With reference to your enquiry on the subject of a gloss for chocolate icing, there are two substances usually used for this—*i.e.*, albumen or gelatin.

Albumen is manufactured in a powdered form as desiccated egg white and this is its cheapest form; it is used in the proportion of 1 lb. to 20 lb. of icing sugar. Gelatin is a cheaper substitute for albumen, and can be obtained in a finely powdered form, the proportion being 1 oz. of gelatin per pound of icing sugar. When gelatin is used, the icing paste should be made up with boiling water, but this is not necessary with a compound containing desiccated albumen, because the latter is rapidly soluble in cold water. Icing made with gelatin is apt to become extremely hard if kept for any length of time, but if the powder is sold for home use or to bakers with a rapid sale this should not be a noticeable disadvantage.

Cream Canning

1,759. *We would be greatly obliged for any information you can give as regards the cost of a small plant and methods of canning milk, condensed milk, cream, etc. We have a plentiful supply of milk in the district, and if the cost of plant, etc., is not excessive we could run this line along with our lemon curd business.* (England.)

In one of our previous issues and in the *Food Industries Manual* we have given a general account of the methods used in the canning of cream and of the plant used. It is now a straightforward matter and the canning engineers are in a position to supply the required equipment. The matter really cannot be usefully discussed without details such as extent of proposed output, capital available, and so on, and your best plan is to put up your proposition to the firms supplying the equipment.

As regards milk, we hear that one engineering firm (name supplied) claims to have successfully canned fresh milk which will keep in good condition for a considerable period.

The preparation of condensed milk is a much heavier proposition. The essential requirement here is an evaporator, and you will have to apply to the engineers to ascertain if this is within the limits of the capital you are prepared to put up for the purchase of plant.

1,760. *Could you tell us, please, where Salycyl parchment paper can be obtained, as we have endeavoured to obtain this material without success?* (Carlisle.)

We have been making enquiries regarding salycyl parchment paper, and we have been informed by an authority on the subject that they do not think it is now being manufactured.

If you are interested in parchment paper, we would suggest that you communicate with Messrs. ——.

Cereal Foods

1,761. *Have you a publication giving formulas or processes for the manufacturing of cereal foods? If not, can you give me particulars where such a publication could be obtained?* (Conway.)

If you refer to breakfast foods, such as flaked, puffed, etc., cereals, then we are afraid that there is no work published on this subject. An article on these lines will, however, shortly be published in FOOD MANUFACTURE. There are, of course, a number of publications dealing with bread and biscuit making.

Almond Meal

1,762. *Required, a list of any commercial or domestic uses of almond meal*—i.e., *the ground cake after extraction of the oil.* (Wales.)

If prepared from bitter almonds, we do not know of any profitable use to which the cake can be put. If from sweet almonds, it would be necessary to examine a sample before expressing an opinion.

1,763. *We require a method for salting nut kernels after blanching.* (London.)

Presumably the methods used are similar to those employed for preparing salted almonds, which may be treated as follows:

The almonds are usually put in water for 2 to 3 minutes. The skins are removed by the ordinary blanching rolls. Dried salt, sufficient to give the desired flavour, is added to the blanched almonds, which are still rather wet and sticky. The salted almonds are agitated until they are well mixed and the salt has either penetrated the almonds or adhered to them. They are then spread on trays or placed on a conveyor and dried in a drying room at a temperature of about 165° to 180° F. When the moisture content has been reduced to less than 1 per cent. they are placed in an oven where the temperature can be maintained at about 320° to 400° F., and they are kept there for about 10 minutes.

Peanut Butter

1,764. *We should be pleased if you would give instructions for manufacturing peanut butter.* (South Africa.)

Particulars of one method were given. Space does not permit of its publication here.

Dried Yeast

1,765. *Information required on the manufacture of dried yeast.* (Midlands.)

The enquirer was referred to the engineering firms supplying centrifugals and vacuum evaporators.

1,766. *Where can I obtain "Taka-diastase"? I understand the enzyme is obtainable as a whitish-yellow hygroscopic powder.* (London.)

The name and address of the English firm marketing this German product were supplied.

Diabetics

1,767. *Can levulose (fructose) take the place, in the food of diabetic people, of the cane-sugar in our ordinary food? If not, what are the reasons? And if it can, is there any other substitute for cane-sugar in the food of diabetic people? Will you please let me know from where I will be able to get the up-to-date literature giving me the physiological effects of levulose on diabetic people?* (Bangalore.)

Regarding this enquiry, Professor Mottram writes us as follows: "Sorry! There is no ground for hope that lævulose is any use in feeding diabetics. The body (*i.e.*, the liver) turns it to glucose and as such it is lost to the diabetic. The work is as old as Carl Voit, who died in 1908.

"There is no substitute for sugar in the diabetic's life. See *The Diabetic Life*, by R. D. Lawrence—himself a diabetic. He writes in his whimsical way, 'The diabetic's life must be fruitless'.

"For further information read Lawrence and McCance, Medical Research Council, Special Report Series, on the available carbohydrates of food."

1,768. *My two sons are trading as grocers and confectioners under the name of "——". Is it necessary to register this name? If so, will you kindly send me the address of the registration office, amount of fee, and also any further information on the subject that may be of value?* (York.)

With regard to your enquiry about the registering of a company, we do not think that you could do better than to communicate with Messrs. Jordan and Sons, Limited, 117, Chancery Lane, London, W.C. 2, who are company registration agents, and who should be able to help you.

Caffeinless Coffee

1,769. *We would like to get details regarding the manufacture of Caffeinless Coffee. Can you furnish this information?* (U.S.A.)

We are afraid that we have no manufacturing details of the preparation of caffeinless coffee. Several patents have been taken out on this subject, as, for example, British Patent 397,323, by Dr. C. Massatsch, in which he states that caffeine-free coffee has been on the market for about a quarter of a century, and has generally been prepared up till now by treating the water-swollen raw coffee beans with organic solvents. Of interest as representing a fundamental divergence from this method of decaffeinisation is a process recently disclosed. Its main features will be readily understood from the following summary of the procedure. Six pounds raw coffee beans are drawn with water at a temperature of 75° to 80° C. until extraction is complete. Evaporation of the extract solution is then carried out until the volume is reduced to 6 litres, at which stage the liquid contains 9 to 10 per cent. of dry extract. Caffeine is eliminated from the concentrate by passing it through a series of steam-jacketed filter tubes, which are filled with a suitable solvent such as chloroform or carbon tetrachloride maintained at the boiling point.

By twice passing the liquid through the filter tubes (containing fresh solvent on each occasion), the whole of the caffeine is removed.

The caffeine-free extract is then used to impregnate the washed beans, which thus regain their natural aroma minus the caffeine originally present.

It is interesting to note that tea can be detheinised in the same manner, the only modification being that a little ammonia is added during evaporation of the extraction to prevent formation of resinous precipitates.

According to Dr. Ziegelmayer the coffee is cleaned thoroughly and then treated with steam. The caffeine is then extracted with a suitable volatile solvent, which must be absolutely pure. This solvent is stated to pass in a continuous stream through cylinders of 6,000 litre capacity in which the berries are steamed. The caffeine is then extracted, and at the same time the so-called coffee wax. Presumably after this the caffeine is crystallised out from the solution and the solvent recovered.

1,770. *A customer of ours asks us if we can supply him with a formula for a coffee essence. It is rather outside our range and we are wondering if you could oblige.* (Lancs.)

We published information on this subject in the July, 1932, issue. If this is not sufficient, we shall be glad to supply further particulars.

1,771. (1) *Please send information concerning the use of non-alcoholic solvents as substitutes for ethyl alcohol in essence making.*

(2) *What is the effect of adding soya lecithin or emulsion oil in margarine making?*

(3) *Please send us a good recipe and directions for making baking powder in a quality similar to the American Royal Baking Powder.*

(4) *Please let us know a good and simple method for dissolving carmine powder to give a solution similar to Breton's cochineal liquid. Is it necessary to add glycerol?*

(5) *Kindly furnish us with small scale and simple methods for the preparation of the following essences from esters, with recipes: banana (synth.), strawberry (synth.), lemon (compound or synth.).* (Tokyo.)

Information on all these points was supplied.

Jam Making

1,772. *We are endeavouring to manufacture jam, and as we are not manufacturing from pure fruit, and have to use pulp, we find that the SO_2 contents in the finished article are above the statutory limit of 40 parts per million. We shall esteem it a favour if you would inform us as to the procedure in boiling, whether pulp and sugar and water should be all boiled together, or whether it is advisable to boil the pulp and water first and add sugar afterwards. Also, with regard to the use of pectin, whether it is advisable to use liquid pectin or dry pectin. As you are aware, the liquid pectin in barrels contains SO_2, and it would mean that we should be increasing SO_2 content for boiling; would the SO_2 all be driven off in the boiling process? How long in your opinion should a batch of 1 cwt. of finished jam take in boiling? Our pans take pressure up to 60 lb. Can you supply us with formulas for manufacturing jam from pulp?*

There is also the question of adding acids to the various jams. We would like to hear from you as to whether it is essential to add these acids in all pulp jam. Again, if liquid pectin is used, there is a possibility of acids being in the liquid pectin. We have been experimenting for a few weeks and we would like to get down to it. If you think it would serve a better purpose for us to interview you, we are quite prepared to call on you at your convenience.

We note your number 1701, that you have supplied information to prevent mildew in jams, and we shall be pleased to have some further information from you. (London.)

The questions raised would take us a long way into the technique of jam making, and we are afraid that we can only touch on most of the points here. An article dealing more adequately with the subject will appear in a forthcoming issue.

Sulphur dioxide content. We appreciate your difficulty in reducing the SO_2 of jams made from sulphited pulps below the permitted amount of 40 p.p.m. There are one or two ways of overcoming the difficulty; the best method is to use a proportion (say 33 per cent.) of fresh or canned fruit. If it is not possible to do this, however, the pulp should be boiled by itself or preferably with the addition of some water for about 5 minutes before the sugar and pectin are added. We would recommend the addition of 2 gal. of water to each 112-lb. recipe. In the case of black currant jam, very great difficulty may be experienced in reducing the SO_2 to less than 40 p.p.m., in which case we would suggest increasing the amount of water still further to 3 gals.—so as to increase the time of boiling. You will, of course, appreciate that any extra water added must be removed by boiling and should not increase the final weight of jam.

Use of pectin. We think for practical jam boiling you would prefer liquid pectin (*i.e.*, containing about 5 per cent. actual pectin), and your recipe would possibly be cheaper than if dry pectin were used. Assuming that you use 8 lb. liquid pectin per cwt. boiling, the amount of SO_2 added in the pectin would be very small, and although pectin is added only about 3 minutes before the end of the boil, you will find that the SO_2 content is not materially increased.

Jam boiling. In answer to your question regarding the time of boiling, we should consider, assuming you are using copper pans, 15 minutes would be the correct time from start to finish of a 1-cwt. boiling. We would recommend, however, if possible, that you increase your steam pressure from 60 to 80 lb. per square inch and so reduce this time to 10 or 12 minutes. (A few practical formulæ for pulp jams were forwarded to our enquirer.)

With regard to the addition of acids, it may be necessary in the case of the less acid fruits, such as strawberries and raspberries, to add a small amount of citric or tartaric acid. The main purpose of such acids is to increase the sugar inversion, and we should not recommend their use with such acid fruits as gooseberries, plums, etc.

Regarding the presence of acids in liquid pectin, we agree with you that there is always this possibility. You can ascertain, however, from the pectin manufacturer the amount and nature of the acid used, and you can then allow for this in your recipe.

Mildew on jams. This is a very wide subject and it would be impossible to deal with it here. We may say, however, that it is largely a matter of storage conditions. Even correctly made jams, which under normal conditions of storage would not mildew, may mould quickly when stored under atmospheric and other conditions which favour mould dissemination and growth.

1,773. *Please inform us how most economically and effectively to finish off jam after pouring.* (Waterford.)

This was done.

1,774. *We read with interest your article on "The Fluorescence Analysis of Foodstuffs" in the July issue of* FOOD MANUFACTURE, *and are keenly interested in the application of this method of analysis to the detection of apple pulp in raspberry, strawberry, gooseberry, and other jams, which the writer mentioned in his article.*

We would like to have full particulars of all the work that has been done upon this particular phase of fluor-

escence analysis. Will you kindly obtain the periodicals in which these appear and post them to us, or obtain references for us so that we may get this information?

We assure you that we appreciate the technical information contained in FOOD MANUFACTURE. (Sydney.)

Our correspondents were referred to a specialist on this subject.

Polishing Raisins

1,775. *We require a good but cheap method of preparing chocolate covering. Also one for polishing raisins and nuts.* (England.)

We are not clear what is in your mind in respect of chocolate covering. Your best plan is to purchase a coverture already made, if you are not using it on a particularly large scale. If you refer to a chocolate compound, a note about this appeared in the November issue, page 415.

With regard to the polishing of raisins and nuts, we think that this is usually done by application of an oil, such as raisin oil, ground nut oil. These are probably better than glycerine, which is also used for the purpose. On page 440 of the December issue it was pointed out that an enterprising American manufacturer has found that, by coating the surface of seeded Muscat raisins with raisin seed oil, applied by a fine spray, their stickiness, which was a considerable sales handicap, is entirely eliminated.

1,776. *We will be highly obliged if you will kindly give us a few addresses of leading glucose manufacturers in Great Britain and the name of the adulterant which can be used with sugar (for boiled goods) to cut down the cost, but it must not give any sort of difference in taste or colour after finish.* (India.)

We are not clear what you have in mind when you speak about an adulterant which can be used in place of part of the sugar. As far as we know, there is nothing which can replace sugar in boiled goods, unless you consider that glucose is used for this purpose, but, of course, it would not be used as an adulterant. In fact, its price may be the same as that of sugar.

As regards the use of glucose in sugared goods, you should read Scarborough's book *Sweet Manufacture*, or if there are any further points no doubt the suppliers of glucose would be glad to assist you.

1,777. *I am experimenting with making a cheap fruit sauce, also lemon curd and gravy browning. I should be obliged if you could let me know if preservatives are allowed in these, and, if so, which preservatives are used and in what quantity.* (Blackpool.)

In reply to your letter, it certainly should not be necessary to use any preservative in sauces, lemon curd, or gravy browning. Only in the case of sauces made from fruits and vegetables do the Public Health authorities allow a preservative—namely, benzoic acid—with a maximum of 250 parts per million.

However, we should imagine that there is nobody using preservatives for sauces, and certainly not in the other products.

The keeping qualities depend on the ingredients used and the correct method of preparation, and if these are in order then there is no danger of spoilage.

Pickling

1,778. *We shall be pleased if you will let us know what is the necessary plant and procedure for packing all kinds of pickles.* (England.)

It is impossible to give any information on this very big subject in the course of a letter. The practical details of pickling vary according to the particular vegetable being pickled and just what type of pickle you want to produce. There are dozens of different types of pickles. One can have mixed pickles or pickles prepared from various types of onions, gherkins, cucumbers, cauliflowers, and so forth.

Any general statement on pickle making would be useless. If you are thinking of going in for pickling, we would strongly advise you to get the services of a man who has had experience in this class of work.

1,779. *We would be very pleased if you could suggest some method whereby a carton can be packed so that it is absolutely damp-proof. We have heard that wax paper is good for this, and we would therefore be pleased if you could give us the names and addresses of the firms supplying this.* (Manchester.)

This was done.

Tomato Chutney

1,780. *We should be very much obliged if you would kindly let us have a recipe for a good rich red tomato chutney.* (Ireland.)

The enquirer was furnished with an example (to provide a basis for his own experiments) of a batch sufficient for a yield of 24 dozen 8-oz. bottles. This is made up from 70 lb. canned, skinned tomatoes, 25 lb. fine chopped onions, 14 lb. seeded and fine chopped raisins, 5 lb. sultanas, 12 lb. fine chopped preserved ginger, 2 lb. fine chopped lemons, 28 lb. sugar, and 1 lb. salt. This would require 4 gal. water and, say, 1 lb. gum tragacanth. Vinegar is added in sufficient quantity, and also spice oils to taste, which might include pimento and cassia. White pepper should also be incorporated, as well as the desired amount of red colouring matter. The whole should be boiled gently for about 15 minutes.

1,781. *Can you send us a copy of your reply to Enquiry* 1,667 *as announced in the October issue of* FOOD MANUFACTURE*? (A recipe for Worcester sauce was required.)* (Oss, Holland.)

This was sent.

Soya Casein

1,782. *Please give us information concerning firms at home and abroad manufacturing soya casein. What are its commercial applications?* (Liverpool.)

We regret that up to the present our efforts to find anything of value in soya casein have been unsuccessful. We are inserting the enquiry in our columns in the hope

that the desired information will be forthcoming from our readers.

1,783. *Please put us in touch with a firm handling soya beans.* (Portsmouth.)

We think that your best plan will be to get in touch with a firm supplying soya flour, such as ——, as they will very probably be able to help you.

Eels in Glass

1,784. *I have been recommended by the Ministry of Agriculture and Fisheries to write you for information with regard to the canning and preserving of eels.*

I wish to try and do jellied eels in glass jars, etc., suitable for commercial purposes.

If you can give me a suitable recipe and method, same will be greatly appreciated. (England.)

Your best plan is to engage an experienced man on this job; otherwise you will have to do a fair amount of experimenting. All we can do here is to give a few general hints.

One method described in America is as follows: Small and medium-sized eels are selected, and the head, skin, and viscera are removed. They are cut into suitable lengths and placed on wire trays and then cooked in a steam retort, or fried in an oven for 20 to 30 minutes. They are then placed in cans (or glasses), either plain or with jelly, or with a vinegar or tomato sauce. The containers are exhausted in the usual manner, closed, and then retorted at 240° F. for a length of time dependent on the size and nature of the container; this will have to be determined by actual trial.

1,785. *Please supply information on the canning of asparagus.* (Southern Rhodesia.)

We have had three articles dealing with the canning of asparagus in FOOD MANUFACTURE, two in the April, 1933, issue (one an American account and the other a German) and one entitled "Canning Asparagus in California" in the Special Canning Issue of November, 1934.

We also have a note in the *Food Industries Manual* by Mr. Hirst, of the Campden Research Station.

Potted Shrimps

1,786. *Our main product is Potted Shrimps. We use nothing but the genuine local shrimp and pure butter. Several of our competitors, including fishermen selling from their cottages, pack imported shrimps—coarser and less flavoursome than the local—and sell them as "Genuine Shrimps" in pure butter, though they use margarine. Should not these be "imported produce"? Can anything be done to prevent the sale of them without being so marked?* (British Isles.)

With reference to your enquiry as to the best procedure in the case of shrimps which are not of the locality which they are claimed to represent, the only method of dealing with the subject is to take proceedings under the Merchandise Marks Act, for giving a false trade description.

The point as to their being potted in margarine, instead of butter, can be dealt with under the Food and Drugs Adulteration Acts or under the Merchandise Marks Act. To settle the latter point you could raise the subject with your Local Authority and ask for the Public Analyst to analyse a sample, which would cost about 10s. 6d., but this would not settle the question of the source of origin of the shrimps, and we think that, on the whole, your best procedure would be to purchase some of the shrimps, if you feel certain of their origin, have them analysed for margarine, and then to take proceedings under the Merchandise Marks Act on both counts at one time. The probability is that if you secured a conviction against one vendor the others would all take care to toe the line.

1,787. *Please give us the name and address of the firm suplying metal caps for jam jars, the Vacon Cap. Pat.* 563,603. (England.)

We regret that it has not been possible to trace the name and address of the firm supplying a metal cap for jam jars with the patent number you have given—namely, 563,603—as this is incorrect. British patent specifications have not yet reached the 500,000 figure.

In case it should have been a foreign specification to which you were referring, we searched through the files at the Patent Office and looked up your number in the German, French, and American specifications, but in none of these cases did the specification have anything to do with metal caps. No other country's specifications have yet reached the 500,000 figure.

1,788. *Please give names and addresses of firms making caps and homogenisers.* (Exeter.)

These were sent.

Cream

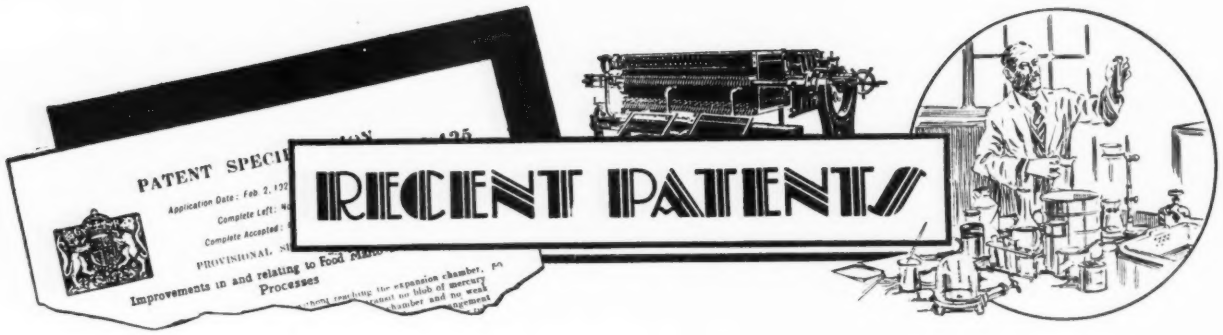
1,789. *Kindly let us have information as to whether there is any material or apparatus for removing the peculiar odour of cream from cows' milk, as consumers in general prefer neutral, odourless cream like artificial cream. The cream is used for pouring over coffee drink. The peculiar smell is said to be due to a particular feeding grass in certain meadows.* (Tokyo.)

We are afraid that there is no way of overcoming the peculiar smell of cream. If it is perfectly fresh it should have an attractive smell. Of course, as soon as it begins to go rancid it has an offensive smell.

1,790. *We should be glad if you would send information concerning:* (1) *Artificial cream making*; (2) *the use of sodium bisulphite as a bleaching agent in sugar and flour bleaching*; (3) *butter and cream flavouring*; (4) *chocolate improver and chocolate glaze compound*; (5) *the makers of monel metal used for chocolate moulds.* (Tokyo.)

Information was supplied. In regard to the chocolate improver, we would point out that we have answered this enquiry previously; reference should be made to the information in the November issue, page 415, and to the article in the issue for December (pages 435-6).

(Replies to Enquiries 1791-1794, wherein information is given concerning Aerated Water Colouring and Compound Fats, are held over to the next issue.)



These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

31506. Bonner, T. W., and Salomon, S. M.: Treatment of bran cereals, etc. November 2.

31555. British Havacone Co., Ltd., and Marshall, E. L.: Manufacture of biscuits. November 2.

31568. Frumentaria Aktieselskab: Cold storage of eggs, etc. November 2. (Denmark, October 15.)

31646. Caldwell, T. F.: Appliance for heat treatment of edibles, etc. November 3.

31845. Cerobrex, Ltd.: Treating and stabilising wheat germ. November 6. (Canada, November 13, 1933.)

31863. Bleeck, J.: Preservatives for animal and vegetable substances. November 6.

31909. Carpmael, A. (I.G. Farbenindustrie Akt.-Ges.): Manufacture of vitamin preparations. November 6.

31980. Baron and Sons, Ltd., and Rowles, A. H.: Drying, etc., cereals. November 7.

32043. Ford, G. S. N.: Manufacture of tea. November 7.

32367. Gibbon, S. H.: Treatment of rice, etc. November 9.

32649. Mills, S. C. (Gare): Appliance for drying coffee beans, etc. November 13.

32673. Dinich, K.: Making bakers' yeast from brewers' yeast. November 13.

33095. Hotlock, Ltd., and Lockyear, F. C.: Apparatus for heating food. November 17.

33675. Green, G. C., and Reid, M. N. Y.: Flavouring substance for foodstuffs. November 23.

33792. Everton, Ltd., E. T., and Padmore, A. T.: Apparatus for cutting, etc., foodstuffs. November 24.

34095. Johansson, K. A., and Wallström, J. A.: Method of treating meat, etc. November 27.

Complete Specifications Accepted

418,682. Prothero, A. E.: Packing of prepared vegetables, salads, or the like.

418,934. Carp, Dr. J. R., and Ruben, A. A.: Refrigerating apparatus for the storage and preservation of food, delicacies, and the like. (Addition to 21818/33.)

419,155. Herbert and Sons, Ltd., and Bagrit, L.: Mincing machines.

419,239. Marguerat, R.: Machines for filling and stoppering containers for food, such as pots of cream or the like.

419,248. Deutsche Staerke-Verkaufsgenossenschaft Eingetragene Gen.: Preparation of a dry product from glucose syrup. (Addition to 411,308.) (Divided application on 411,308.)

419,272. Carp, Dr. J. R., and Ruben, A. A.: Refrigerating apparatus for the storage and preservation of food, delicacies, and the like. (August 3, 1933.) (Addition to 417,219.) (Divided application on 417,219.)

419,416. Collomb, L. S.: Machine for cleaning and brushing the moulds used in the manufacture of cheese.

419,481. Keller, H. W.: Process of preserving fruit juices in their natural state.

419,668. Fowler, S., and Benfield, P. J.: Preservation of eggs.

419,838. Chivers and Sons, Ltd., Rendle, T., and Bolton, E. W.: Manufacture of jellies.

419,988. Ward, Ltd., T. W., and Elliott, F.: Meat-chopping or mincing machines.

420,126. Paolini, M., and Perco, F.: Cutting machines for slicing meat and the like. (February 23, 1933.)

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per group volume, or in bound volumes price 2s. each.

415,056. **Mixing machines.** Falkner, C. E., Astor Hotel, Auckland, New Zealand.

A butter churn or worker has an air-tight cover fitted with a valve-controlled outlet for suction apparatus by which vacuum is produced in the churn. A jacket surrounds the churn and leaves a space for circulation of cooling or heating medium. An air relief valve controls the amount of vacuum. The churn is supplied with cream by an inlet provided with a rose to prevent frothing. The body of the churn is provided with two parallel beater shafts geared together. Strips are attached to arms of different length so as to follow different courses through the material acted upon.

E.P. 417,552. **Improved drying process for soya bean lecithin.** Metallgesellschaft A.-G., and Datz, A., 45, Bockenheimer Anlage, Frankfurt-on-Main.

The fresh soya sediment precipitated during the course of steam treatment of soya bean oil contains a high proportion of lecithin in admixture with water and soya oil. To avoid fermentation of the sediment (which is accompanied by darkening and development of an unpleasant smell), it is desirable to dehydrate the product. Owing to the sensitivity of lecithin in the pure state to air and heat, elimination of water calls for special measures. According to the present invention, the lecithin is protected against deterioration by mixing the sediment with a carrier such as casein, gelatine, glucose, or flour, and then dehydrating by spray-drying in a current of warm air. Each particle of sediment is thus enveloped by a carrier which effectively insulates the lecithin. For example, 50 parts of unfermented soya sediment consisting of lecithin, water, and a little oil are mixed to a homogeneous mass with 30 parts casein and the whole spray-dried in a warm air current.

E.P. 418,211. **Stable invertase preparations.** Standard Brands, Inc., 595, Madison Avenue, New York, U.S.A.

A process for economically separating invertase from yeast is conducted on the following lines: The yeast cells are first killed by treatment with 2 to 3 per cent. toluene in the presence of 0·5 to 2 per cent. sodium carbonate and the yeast allowed to autolyse for a few days at 25° to 35° C. in the presence of alkali. After diluting with 70 per cent. water and filtering in presence of kieselguhr, the filtrate in which the invertase is

present is acidified with mineral acid (preferably 85 per cent. phosphoric acid diluted five times) in the presence of a small proportion of decolorising carbon. A precipitate is formed consisting mainly of yeast protein, which is filtered off after a few hours. The filtrate is reacted with sufficient antacid substance to give a *p*H of 4·5 to 6·5. This invertase preparation possesses high activity and need not be concentrated further before marketing. It is advisable to incorporate a preservative (ethylene glycol, glycerol, cane sugar, etc.). In admixture, for example, with 50 per cent. glycerine the preparation retains its activity, colour, and clarity for many months when stored at 14° to 15° C. (Convention date, U.S.A., June 21, 1932.)

E.P. 418,364. **Preservation of food products.** BURR, W. F., and GRIGGS, V. H., 79, Hopton Road, Streatham, London, S.W. 16.

This process is based upon the principle of delaying fermentation and putrefaction by removing all dissolved oxygen from food products (fruit, vegetables, meat, dairy products, etc.) at controlled temperatures and pressures. The pressure, reduced by means of a vacuum pump, is so adjusted as to be just below that of the boiling point of the liquid content of the products at the temperature of operation. The so-treated products are then maintained in an inert atmosphere—*e.g.*, nitrogen—at a temperature not below 4° C. in the case of most fruits and vegetables. Continuous operation is practised in a special apparatus comprising a series of compartments in which the foodstuffs travel in succession through evacuating and inert gas-impregnating chambers. The process is stated to have proved successful in application to fruit prior to shipment (pineapples, bananas); to all forage crops; to canned butter; to peaches, apricots, and plums when treated by the process on arrival in England from South Africa and maintained at 4° C. Orange and lemon juice treated by this method are stated to keep in perfect condition for two months.

NEW COMPANIES

ABBEY BREWERY COMPANY, LIMITED. To carry on the bus. of mnfrs. of and dlrs. in cider, beer, aerated and mineral waters, etc. Nom. Cap.: £9,000. Dirs.: H. Stubbing, Went House, West Malling, Kent; Col. B. Luck, The Hermitage, W. Malling, Kent; W. T. Smith, 31, Soho Square, W.; E. T. Smith, 31, Soho Square, W.

ABBOTTS (GROCERS AND CONFECTIONERS), LIMITED. 42, St. Mary's Row, Moseley, Birmingham. To carry on the bus. of grocers and confectioners, etc. Nom. Cap.: £500.

ADAMS (DURHAM), LIMITED. To take over the bus. of mnfg. confectioners cd. on at Durham as S. Adams and Co. Nom. Cap.: £12,000. Permt. dirs.: T. Adams, 42, Claypath, Durham; W. Adams, 39, Claypath, Durham; Eleanor Taylor, address not stated.

ALBERT MILLS AND SONS (OLDHAM), LIMITED. Warehouse, Stourport Street, Oldham. To take over the bus. cd. on by A. Mills at Oldham, and to carry on the bus. of grocers and provision merchants, etc. Nom. Cap.: £500.

ANTHONY OATES, LIMITED. Kells Lane, Low Fell, Gateshead. To carry on the bus. of producers and mnfrs. of and dlrs. in sauces, spices, pickles, etc. Nom. Cap.: £300.

BOVRIL (S.E.), LIMITED, Dublin. To carry on the bus. of mnfrs., exporters, and importers of animal, vegetable, or other substances (separately or in combination) for use as food, and also of meat foods, extracts and products, etc. Nom. Cap.: £40,000.

CHILL-NIPS, LIMITED. 42, Meyrick Road, North End, Portsmouth. To carry on the bus. of mnfg. confectioners, etc. Nom. Cap.: £1,000.

DUNN, AYRES AND DAVIES, LIMITED. 43, East Street, Taunton. To take over the bus. of bakers' sundrymen cd. on by E. J. Dunn and F. R. B. Davies at Taunton. Nom. Cap.: £1,000.

EASTBOURNE CATERERS, LIMITED. Barclays Bank Chambers, Terminus Road, Eastbourne. To take over the bus. of bakers, confectioners, etc., cd. on by Hammicks, Ltd., at Eastbourne. Nom. Cap.: £3,000.

EXCELICE CREAM, LIMITED. To take over the bus. of mnfrs. and sellers of ice-cream cd. on at 27, Drummond Road, Croydon, as "Excelice Cream Co." Nom. Cap.: £1,000.

FYLDE CANNERS, LIMITED. 93, Victory Road, Blackpool. To take over the bus. of a canner of chickens, meats, and fruits cd. on by W. Barron at Blackpool. Nom. Cap.: £500.

FYLDE CONFECTIONERY COMPANY, LIMITED. To carry on the bus. of mnfrs. of and dlrs. in confectionery, etc. Nom. Cap.: £1,000. Dirs.: N. Booth, 156, Cornwall Avenue, Blackpool; N. Arnold, 47, Newhouse Road, Blackpool.

H. H. HARDY, LIMITED. 39, St. James Road, Southsea, Hants. To take over the bus. of a wholesale grocer and provision merchant cd. on by H. H. Hardy at Southsea. Nom. Cap.: £1,500.

HYDES CEREALS, LIMITED. To carry on the bus. of mnfrs. of and dlrs. in foodstuffs and food products, etc. Nom. Cap.: £100. Dirs.: S. W. Copley, address not stated; F. Bowman, St. Davids, Castlemaine Avenue, South Croydon; R. J. Hunter, address not stated; S. R. Copley, Deacons Hill, Elstree, Herts.

IDEAL FOODS, LIMITED. 22, Blakeland Street, Bordesley Green, Birmingham. To take over the bus. of makers and suppliers of cooked meats cd. on by the Ideal Manufacturing Co. at Birmingham. Nom. Cap.: £2,000.

KEEN AND WESTREN, LIMITED. To carry on the bus. of dlrs. in fresh and preserved fruits, vegetables, farm produce, etc. Nom. Cap.: £1,000. Dirs.: A. G. Keen, 240, Bishopsgate. E.C.; S. Westren, 240, Bishopsgate, E.C. 2.

KILONER BRAND PRODUCTS, LIMITED. Foots Buildings, Preston Village, Tynemouth. To take over the bus. of a preserved food mnfr. cd. on by H. A. Harrison at Whitley Bay and elsewhere. Nom. Cap.: £1,000.

LEATHARDS, LIMITED. To take over the bus. of grocers, provision merchants, etc., cd. on at 122, Sandyford Road, and St. George's Terrace, Newcastle-on-Tyne, as "Leathards." Nom. Cap.: £10,000.

L. FINE AND COMPANY, LIMITED. 106, Cheapside, E.C. 2. To carry on the bus. of grocers, provision merchants, etc. Nom. Cap.: £1,000.

L. H. LANE, LIMITED. The Bakery, Swanley Village, Swanley, Kent. To carry on the bus. of biscuit mnfrs., bakers, etc. Nom. Cap.: £500.

LIVERPOOL CHEESE HOUSE, LIMITED. To carry on bus. as produce, cheese, and provision factors, etc. Nom. Cap.: £500. Dirs.: Mrs. C. Raw, 20, Queen's Road, Bootle, and W. A. Williams, 5, Charlton Terrace, Barrow, Lancs.

LORENZO CROCE, LIMITED. To take over the bus. of a preserved food and pickle mnfr., etc., cd. on by Lorenzo Croce at 30-32, Rhyl Street, Malden Road, N.W. 5. Nom. Cap.: £100.

LOWES CAFES, LIMITED. Jockey Road Corner, Birmingham Road, Wylde Green. To carry on the bus. of confectioners, bakers, etc.

ORVILLE CREAMERY, LIMITED. 47, Headingley Lane, Headingley, Leeds. To carry on the bus. of dairymen, etc. Nom. Cap.: £100.

RAY LANCE, LIMITED. Opera House Yard, St. Thomas' Street, Scarborough. To carry on the bus. of provision and general merchants, etc. Nom. Cap.: £6,000.

SWAN FOOD PRODUCTS COMPANY, LIMITED. To carry on the bus. of provision merchants, etc. Nom. Cap.: £300. Dirs.: H. J. Lawrence, 34, Brooke Street, E.C.; and R. G. Fielder and F. Thompson, of 39, Ealing Park Mansions, Ealing, W. 5.

WINDSOR CONFECTIONERY, LIMITED. 5, Crogsland Road, Chalk Farm, N.W. To carry on the bus. of mnfrs. of and dlrs. in chocolates and confectionery, etc. Nom. Cap.: £600.

WRAY AND SONS. LIMITED. 4, Carisbrooke Road, Newport, I.O.W. To carry on the bus. of grocers, provision merchants, etc. Nom. Cap.: £10,000.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.

RECENT TRADE MARKS

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

B. AND B.—553,193. **Wrapped bread.** BIRKETT AND BOSTOCK, LTD., Coronation Bakery, Swallow Street, Stockport. December 5. (By Consent.)

Registration of this trade mark shall give no right to the exclusive use of the letters and abbreviation "B. and B."

BLUE PETER.—554,641. **Coffee, tea, cocoa, ginger, pepper, and cardamons (for food).** MYSORE PLANTATIONS, LTD., 9a, Woodland Road West, Colwyn Bay. November 21.

BRITTOLEX.—555,036. **Edible oils and fats.** THE SOUTHERN OIL CO., LTD., Westinghouse Road, Trafford Park, Manchester. November 21.

CHEGGS.—554,624. **Food preparations consisting principally of cheese and eggs fried with bread crumbs and sold in form of cubes.** ORCHARDS FOOD PRODUCTS, LTD., Orchard House, 104, Southwark Street, London, S.E. 1. November 21.

COVERED WAGON. — 554,888. **Condensed milk.** LEON MOOCHNIK, trading as J. C. Ratner and Co., 146, Bishopsgate, London, E.C. 2. November 28.

CREAMALILLI.—553,246. **Pickles.** FREDERICK STEVENSON, 11, Chapel Bar, Nottingham. November 28.

CUTTY SARK.—555,303. **Bread, biscuits, and cakes.** WILLIAM BEATTIE, LTD., Dennistoun Bakery, 116, Paton Street, Glasgow, E. 1. December 5.

FARMGIRL.—554,549. **Substances used as food or as ingredients in food, but not including poultry and not including any goods of a like kind to poultry.** HOME INDUSTRIES, LTD., 76, Station Road, Worthing, Sussex. November 21.

GOLDEN GLADE.—553,950. **Butter.** EMPIRE PROVISION CO., LTD., 34a and 36, Coborn Street, Bow, London, E. 3. December 5.

GROX.—554,580. **Thickening and flavouring matter (not alcoholic) for gravies, soups, stews, and like foods.** The firm trading as Trifona Specialities, Caledonia Works, Caledonia Road, Stoke-on-Trent. November 21.

HABACURE.—554,527. **A preparation consisting principally of salt and spices, for use in curing bacon, hams, and other meats, and becoming an ingredient therein.** HABACURE, LTD., 43, Drury Lane, London, W.C. 2. November 21.

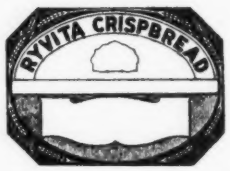
HIM-DAR.—554,864. **Tea.** The firm trading as Himalaya Tea Distributors, 37, Wilton Place, Knightsbridge, London, S.W. 1. November 21.

KING SOL.—553,305. **Bread, flour, and cakes.** MALPAS BROS., LTD., 121, Handel Street, Lodge Lane, Liverpool. November 21.

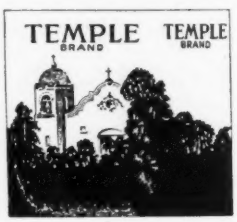
MELVIS.—554,530. **Bread.** JOHN WALTER FLOWER, trading as Riverside Hotel and Café, Salisbury Street, Fordingbridge, Hampshire. November 21.

PANCOLEX.—555,039. **Edible oils and fats.** THE SOUTHERN OIL CO., LTD., Westinghouse Road, Trafford Park, Manchester. November 28.

RYVITA.—554,269. **Bread and biscuits.** THE RYVITA CO., LTD., 96, Southwark Street, London, S.E. 1. November 21. (Associated.)



TEMPLE.—539,960. **Raisins and sultanas.** GUGGENHIME AND CO., 150, California Street, San Francisco, California, United States of America. November 21.



VAC-PAC.—555,065. **Substances used as food or as ingredients in food.** V.P. PRODUCE, LTD., Universal House, Southwark Bridge, London, S.E. 1. December 5. (Associated.)

WESSOLEX.—555,037. **Edible oils and fats.** THE SOUTHERN OIL CO., LTD., Westinghouse Road, Trafford Park, Manchester. November 28. (Associated.)

ZENITH.—553,621. **Condensed milk and cream.** The firm trading as Sønderbys Fabriker, 28, Sct. Annæ Plads, Copenhagen K, Denmark. November 21.

MILK RETAILING

IN certain districts it has been observed that it is a common practice for retailers to boil surplus milk in the evening and sell it next morning. A woman buying such milk would therefore receive milk whose vitamin had been destroyed. Had she asked for pasteurised or sterilised milk she would have known that it was necessary to add fresh orange juice to the diet to balance this deficiency, but, not realising that the milk had been heated, she possibly might not add such a necessary adjunct.

The legal position seems to be that if a purchaser asked merely for milk there would be considerable difficulty in establishing that he had not received the article demanded when supplied with milk which had been heated and which complied with the Sale of Milk Regulations of 1901. On the other hand, if the purchaser asked for fresh milk or new milk and was supplied with milk that had been heated, he would not, it seems, be getting what he had asked for any more than if he had been supplied with skimmed milk. It is apparent that if people want fresh milk they should ask for fresh milk, whereas if they merely ask for milk they may be given a milk that has been heated without being told that it has been so treated.